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## K. KISHINOUYE—JAPANESE SPECIES OF THE GENUS PENAEUS

(Pl. I—IX)

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# JAPANESE SPECIES OF THE GENUS *Penaeus*.

BY

K. KISHINOUYE.

With Pl. I—IX.

Prawns belonging to the genus *Penaeus* are the most important crustaceans in Japan. They are highly prized and extensively used as food and bait and dried prawns annually exported to China amount to about 900,000 kilogrammes in weight and about 200,000 yen in value. The dried prawns almost exclusively belong to the genus *Penaeus*.

Prawns live in inshore waters, especially in bays and inlets of sandy or muddy bottom, mostly in the depth of less than 60 metres. They are very abundantly captured with small trawls, dredges, fyke-nets, etc. in the Inland Sea, Bay of Ise, Bay of Tokyo and many other places round our coast. However, they are scarce on the coast of the Japan Sea and on the northeastern coast, so that they seem to prefer warm water.

Prawns generally feed on living or dead animals, such as Crustacea (*Gammarus*, *Caprella*, etc), Vermes, Echinoderms, Mollusca (especially small immature Gastropoda and Lamellibranchiata) and sometimes fish. Some species, especially *Penaeus Joyneri* prefer microspical algae. The shell of such species is soft. When they are kept alive in ponds, they attack and devour each other. In such cases newly moulted creatures easily fall the victim.

The growth of prawns is very rapid. Small prawns reach matu-

rity when one year old, and most of them, I believe, die out after spawning. Large prawns such as *Penaeus canaliculatus*, *P. ~~semisulcatus~~ ashiaka*, etc reach maturity after two years and they do not die after spawning. Some large species attain the size of about 27 cm.

The male seems to develop more slowly than the female. The former becomes mature and attains the maximum size of growth at a smaller size than the latter. The difference between the biological minimum size and the maximum size of growth is always nearly equal in both the sexes of the same species and this difference is greater in the species which maintain longer life. Generally speaking females are larger in size, have the larger carapace and the longer and more curved rostrum when compared with males.

The ovary is composed of a pair of long, thick tubes, running from the root of the rostrum nearly to the tail segment. They give off side branches and the oviduct at the thoracic region, and there just before the heart they are connected together by a transverse commissure with each other. Generally they ripen at the end of spring and spawning takes place in summer and autumn. They are very slender, colorless and nearly transparent when their reproductive elements are immature; but when these elements gradually begin to ripen they become opaque and yellowish in color and finally become rich green in color and increase in thickness. Eggs are discharged from time to time as they ripen. The oviducts are extremely short and thin-walled.

The testis is a furcated horse-shoe shaped gland in the thoracic region. It lies partly surrounding and partly beneath the heart. The gland is flat, colorless and translucent.

Some species have a spermatophore at the end of the ductus ejaculatorius. In *Penaeus canaliculatus*, *P. ashiaka* and *P. curvirostris* males have always a pair of spermatophores and copulate throughout the year. Immature females not unfrequently contain spermatophores or

masses of spermatozoa in the seminal receptacle. And those species, living more than one year, copulate soon after spawning. Young but mature males have very small spermatophores (ca. 5 mm. in case of *Penaeus canaliculatus*); but I do not yet find such small spermatophores received by females. The spermatophore, produced on the right side of the animal is transferred to the right side of the seminal receptacle. The part of the spermatophore which lies nearest to the genital opening will lie in the seminal receptacle also near its opening.

In some species the spermatophore has an appendge. It is most remarkably developed in *Penaeus canaliculatus*. It was first described and figured by Spence Bate in the Challenger Report; but his observation was only superficial. In *P. canaliculatus* the appendage is wing-shaped. When it is taken out from the end of the ductus ejaculatorius, it is flesh-colored; but the color changes gradually to greenish yellow. Its consistency too undergoes gradual changes. It is very soft and somewhat glutinous at first and becomes hard and inflexible later. In *P. monodon*, *P. ashiaka* and *P. latisulcatus*, the appendage of the spermatophore is white, long, flexible and band-shaped. It will protrude out of the seminal receptacle at first, but I do not find it. Probably it will be worn away very quickly.

*Penaeus Joyneri* does not form a spermatophore; but we find on the external wall of its seminal receptacle a pair of white, leaf shaped bodies after copulation. These leaf-shaped bodies, are, most probably, homologous to the appendage of the spermatophore in other species.

In *Penaeus affinis* similar bodies are formed as in *P. Joyneri*, but they are very small and they are not always found on the outer wall of the seminal receptacle. In *P. curvirostris* we find no such appendages of definite shape, but only a mass of glutinous body cemented to the depression of the external wall of the seminal receptecle or the thelycum. The hardened mass is semitransparent and yellowish in color.

Moulting takes place from time to time. It is done by the old crust becoming brittle and breaking away gradually. The entire crust is cast away in larval stages only.

Swimming larvae of *Penaeus* are very widely distributed in shallow waters. They are often found in waters shallower than the place where spawning animals live. I have collected last summer different stages of larvae from *Nauplius* to the stage of young prawns. They are very minute. In the *Nauplius* stage they are 1/4—1/2 mm. and in the *Zoea* stage about 3/5—2 m m. Their motion in the water is rather inactive. Larvae of some species in the *Zoea* stage have many bright pigment cells. These cells generally expand in the dark places and contact when exposed to light. *Protozoea* of some species have a pair of short spines or teeth at the anterior margin of the carapace, just anterior to the rudiments of the compound eyes (Pl. VIII, 4). In another species I found two pairs of such teeth (Pl. VIII, 6).

In the newly hatched *Nauplius*, we find no cilia on the bristles of the appendage (Pl. VIII, 1). In the later stages of the *Nauplius*, the body and some appendages are already segmented (Pl. VIII, 2,3). In the *Protozoea* stage the metastoma appears as a paired knob, just behind the mandibles (Pl. VIII, 5). In the *Metazoea* stage bristles of the first appendage are not ciliated. The simple median eye is found in the young prawn stage too (Pl. VIII, 8).

Most shore fishes feeding on the bottom are enemies of adult prawns; and fishes like Clupeidae, Carangidae, etc. do much injury to swimming larvae.

At present I have 13 species of the genus *Penaeus*, all from the waters of our country. As the determination of species of this genus is unusually difficult, I have studied a great many specimens in different

stages of development and also in large numbers. Moreover I had a good chance though the kindness of the authorities of the British Museum (Natural History) to examine the large collection of *Penaeus* in the Museum. From the study of these materials I found that the most reliable point about the determination of species is the comparison of the structure of the external, secondary sexual organs, the so-called the petasma and the thelycum, though differences of their structure are sometimes very slight in case of closely allied species. The chief difficulty in identification, however, lies in the incompleteness of original descriptions and figures.

# SYNOPTICAL KEY TO THE JAPANESE SPECIES OF PENAEUS.

I. Lower margin of the rostrum toothed, the cavity of the seminal receptacle single and its internal wall membranaceous. Shell smooth, having no setae. Spermatophore has an appendage. Vas deferens short and thick, not much convoluted.

A. Only one tooth on the inferior margin of the rostrum. Three small spines on each side of the tail segment. Dorsal median line of the carapace is grooved. Grooves running on each side of the central groove reach the posterior end of the carapace. Pereiopoda stout. The posterior end of the inner lamina of the petasma is prolonged and is turned exteriorly. Second segment of the first and second pairs of pereiopoda ha[s] a spine.

1. Dorsal median groove of the carapace is nearly equal in breadth to the lateral grooves. Lateral plates of the thelycum is not divided and the opening of the seminal receptacle has the shape of a lateral slit. Spermatophore has a wing-shaped appendage. External rim of the petasma thick. Anterior end of the inner lamina of the petasma ends with a soft crooked protuberance. Rostrum 8—10 dentate above.

*P. canaliculatus.*

2. Dorsal median groove of the carapace is narrower than the lateral grooves. Central plate of the thelycum has a forked, calcified appendage at the anterior end. Lateral plates meet at the median line of the body, forming the sides of the longitudinal opening of the seminal receptacle. Appendage of the spermatophore is a narrow fibrous band. Anterior end of the internal lamina of the petasma does not extend beyond the external lamina. Rostrum 10 or 11 dentate above.

*P. latisulcatus.*

B. Three teeth on the inferior margin of the rostrum. Lateral grooves of the carapace run only half the length of it. Pereiopoda slender. Posterior end of the internal lamina of the petasma is produced to a short straight protuberance. First pair of pereiopoda bispinose, the second pair unispinose.

3. Dorsal median groove of the carpace present. Lateral grooves terminate a little behind the gastric tooth. Flagellae of the first pair of antennae shorter than the peduncle of the same. Lateral plates of the thelycum meet at the median line of the body. Very minute teeth near the anterior external margin of the petasma. Rostrum 7 dentate above.

*P. ashiaka.*

4. Dorsal median groove of the carapace wanting. Lateral grooves are lost near the level of the gastric tooth. Flagellae of the first pair of antennae longer than the peduncle of the same. Central and lateral plates of the thelycum meet in Y shaped lines. Outer rim of the petasma is bent, pointed and has some very minute teeth

near the anterior end. Rostrum 7 or 8 dentate above.
*P. monodon.*

II. No tooth on the inferior margin of the rostrum. Seminal receptacle consists of two chambers. Their walls calcareous, sometimes membranaceous. No appendage to the spermatophore. Vas deferens long, slender and coiled several times. Shell generally covered with setae, rarely naked.

C. Dorsal median kiel of the carapace present, but rather faint. No tooth at the anterior, inferior angle of the carapace.

a. First to third pairs of pereiopoda unispinose. In males the fourth joint of the fifth pair of pereiopoda has a tubercle, the pleuron of the first pleonic segment is notched at the inferior margin and the sixth pair of pleopoda has also a tubercle. Exterior as well as the interior walls of the seminal receptacle are calcified. Its cavity is divided by a median septum and opens by two slits. Tail segment unarmed.

5. In females the first joint of the fourth pair of pereiopoda expands to a disc-like process which abuts just the anterior margin of the thelycum. Lateral plates of the thelycum is flat for the most part. Distal end of the inner lamina of the petasma is a flat process. Distal end of the outer lamina extends laterally. Rostrum serrated to its apex, 8 or 9 dentate. First—fourth segments of the pleon naked.
*P. affinis.*

6. In females the first joint of the fourth pair of

pereiopoda expands as in *P. affinis.* External margin of the lateral plates of the thelycum raised to a ridge. Distal end of the inner lamina of the petasma is large and convex and nearly covers the distal end of the outer lamina. Rostrum serrated to its apex, 8 dentate. Narrow, irreguler grooves in the shell which are thickly beset with setae.

*P. incisipes.*

7. Lateral plates of the thelycum convex. Anterior end of the internal lamina of the petasma long, narrow and curved dorsally. Apex of the rostrum slender and devoid of teeth. Rostrum 7 dentate. Shell beset with setae.

*P. Joyneri.*

b. First pereiopoda bispinose, second and third unispinose. Walls of the seminal receptacle calcified and its cavity divided by a median septum. Tail segment armed.

8. With irreguler pubescent furrows. Rostrum 9 dentate.

*P. intermedius*

c. Second joint of the first and second pereiopoda unispinose. Seminal receptacle consists of two entirely separate cavities. Carapace with a pair of fissures. Peduncle of the second pair of antennae with a tooth.

9. Carapace smooth and naked. Rostrum short, slightly longer than the eyes. No gastric tooth on

the carapace.

*P. tenellus.*

10. Carapace with setae at the upper, anterior part.

*P. cornutus.*

D. Tooth at the anterior, inferior angle of the carapace. Second joint of the first and second pereiopoda unispinose. Dorsal median kiel is found from the second somite of the pleon backwards. Lateral spines on the tail segment. Seminal receptacle consists of two entirely separate cavities. Shell thickly beset with setae.

d. Petasma bilaterally symmetrical. No spine between the second pair of pereiopoda.

11. Lateral spines of the tail segment very minute, hardly visible with naked eyes.

*P. curvirostris.*

e. Petasma not bilaterally symmetrical. Paired spines between the second pereiopoda. 3 pairs of movable spines and 1 pair of not-movable spines on the tail segment.

12. Rostrum broad and short, slightly longer than the eyes.

*P. lamellatus.*

13. Sixth pleonic segment and the tail segment long, subequal in length to that of the sixth pleopoda. First joint of the fourth pereiopoda enlarged.

*P. velutinus.*

# PENAEUS CANALICULATUS.

(Pl. I)

*Penaeus canaliculatus*, Olivier, Encycl. mèth. Nat. Hist. viii (1811), M-Edw., Hist. Nat. Crust. ii (1837); de Haan, Fauna Japon. Crust. (1849); Sp. Bate, Challenger Rep. Crust. Macrura (1888); Ortmann, Zool. Jahrbuch. Abth. Syst. p. 448 (1890).

The shell smooth, thick and hard. The rostrum slightly curved, 8 or 9, rarely 10 dentate above and toothed below. It is a little longer than the peduncle of the first antennae. Continuous to the rostral kiel, there is a grooved kiel, which reaches nearly to the posterior margin of the carapace. On each side of the rostrum and the kiel, there is a groove which also reaches nearly to the posterior margin of the carapace. The flagellae of the first pair of the antennae are very short, almost equal to the length of the two distal segments of the peduncle. The pereiopoda are rather thick and robust. The basis of the first and second pairs of pereipoda is provided with a spine. The telson with three pairs of small movable spines.

The thelycum, the external wall of the seminal receptacle, has the pocket-like appearance externally, as the two lateral plates are united in the median line (Pl. VII, 1 A, 1 B). The cavity of the receptacle is single. The wall of the receptacle, external as well as internal, is not calcified.

The petasma is simply folded longitudinally (Pl. VII, 1). The outer rim is thick, calcified and blunt at the distal end. The inner lamina thin, membranaceous and much prolonged posteriorly and it is differentiated to a free, thick and fleshy portion at the anterior end.

The spermatophore is provided with a wing-shaped appendage which stretches out of the seminal receptacle in a pair (Pl. VII, 1 C).

The mature male has a spermatophore always in the dilated end of the ductus ejaculatorius of each side and the mature female carries always a pair of spermatophores in the seminal receptacle, even soon after the spawning.

The color of the animal is light brown or greyish brown with about eleven transverse bands of darker color. The color of the rhipidura is splendid, it is fringed with red hairs and its margin is colored with blue and yellow in succession. Appendages are greenish. Immature specimens are darker and bluish in color (Pl. I, 1).

The male reaches maturity when it is 12 cm. in length, while the female matures at 15 cm. The largest specimen examined is 27 cm. in length.

This animal prefers the sandy bottom. When young it is found in a very shallow water; but after it has grown old, it seeks deeper water, especially in colder months.

Chiefly captured with trawls.

This is generally known under the name of "kurumayebi."

## PENAEUS LATISULCATUS. Nov. Spec.

(Pl. II, 2)

The shell smooth, polished, thick and hard. The rostrum slightly curved, is armed with 10, sometimes 11 teeth on the upper and 1 tooth on the lower side of it. It is not longer than the peduncle of the first pair of antennae. Three grooves at the middle part of the carapace almost reach the posterior margin of it, as is the case with *P. canaliculatus;* but the lateral grooves are broader than the median groove as in *P. caramote.* In immature specimens, however, the three grooves are almost equal to each other in breadth. The flagellae of the first pair of antennae are very short. A short styliform spine is

found at each basisal joint of the first and second pairs of pereiopoda. Three small movable spines are found on each side of the telson.

The lateral plates of the thelycum come in contact with each other at the median line (Pl. VII, 2 A). The median plate is small and is partly covered by the lateral plates. At the anterior part of the median plate, there is a protuberance which is divided into two thin, calcareous horns. The cavity of the seminal receptacle is single and its wall is membranaceous.

The petasma is simple (Pl. VII, 2). Its outer margin is very thin and the distal end of the inner lamina ends promptly. The appendage of the spermatophore is soft and band-shaped, does not protrude out of the seminal receptacle. Probably it does protrude at first, but it would be worn away soon.

The color is light brown or sometimes greyish, especially in young animals. The dorsal median kiel of the carapace and the same in the fourth to the last pleonic segments are black. There are also some dark marks near the ventral margin of the pleonic segments.

The langest specimen in my collection measures 15 cm. in length.

This is rather a rare species. Specimens in our laboratory are from the Tokyo Bay and Kagoshima.

This is very closely allied to *P. canaliculatus;* but is easily distinguished from it by the shorter rostrum, broader grooves, the longitudinal opening of the seminal receptacle, the appendage of the spermatophore, etc. Also very closely allied to *P. caramote;* but the latter has a spine on the coxal segment of the first to third pairs of pereiopoda and the spermatophore has a soft wing-shaped appendage, which protrude out of the seminal receptacle.

As this animal is very few in number, it is confounded with other species and has no special name for itself.

# PENAEUS ASHIAKA. Nov. Spec.

(Pl. III)

The shell is rather thick and smooth. The rostrum slightly curved, 7 dentate above and 3 dentate below. The dorsal median carina of the carapace is canaliculated and extends almost to the posterior margin of the carapace. The lateral grooves do not extend to the posterior margin of the carapace, but terminate abruptly at its middle part, a little behind the gastric tooth. The first pair of pereiopoda is armed with two spines (one on basis, the other on ischium) and the second pair with one spine on basis. The telson has no armature.

The seminal receptacle (Pl, VII, 3 A, 3 B) resembles that of *P. latisulcatus*, but the calcified appendage to the median plate of the thelycum is wanting.

The petasma (Pl. VII, 3) is longitudinally folded. Its outer part is thick, calcified and is furnished with very minute teeth at the anterior margin. The distal end of the inner lamina short.

The spermatophore has a long, soft, band-shaped appendage which is united to the spermatophore nearly with a right angle to its axis.

The color is greyish brown or bluish and about twelve pairs of darker and lighter shades alternate each other. The appendages are carmine red. The second antennae are colored with red and light brown in alternation.

The animal attains the length of 22 cm. The largest male examined is 18.5 cm. in length.

Roughly speaking this species is found along the southern half of our coast.

Is known under the names of "ashiaka," "kuroyebi," "kumayebi," etc.

This species closely resembles *P. monodon* (*P. semisulcatus*) and is often confounded with it, but differs from the latter by the shorter flagellae of the first antennae and also in the minute structure of the petasma, color, etc.

## PENAEUS MONODON.

(Pl. II, 1)

*Penaeus monodon*, Fabricius, Suppl. Ent. Syst. (1798); M-Edw., Hist. Nat. Crust. (1837).

*Penaeus semisulcatus*, de Haan, Fauna Japon. Crust. (1849); Miers, Proc. Zool. Soc. p. 299 (1878).

The shell thick and polished. The rostrum slightly curved, about 2/3 time as long as the carapace, 7 or 8 dentate above and 3 dentate below. The flagellae of the first pair of antennae are as long as the peduncle. The dorsal median carina of the carapace becomes gradually low and less distinct as it approaches the posterior margin of the carapace and disappears before reaching it. Generally the carina is not grooved. When it is grooved, the groove is very faint. The lateral grooves are lost near the gastric tooth. The first pair of the pereiopoda is bispinose, the second pair unispinose.

The seminal receptacle (Pl. VII, 4 A) is almost the same as that of *P. ashiaka*. The outline of the thelycum is oval and its central plate is larger than that of *P. ashiaka*.

The petasma (Pl. VII, 4) closely resembles that of *P. ashiaka* in the general appearance. The distal end of its anterior end is pointed and near that point we find a few minute teeth. But this part is concealed under a soft membrane.

The color of the animal is dark brown or rarely blackish. Darker and lighter shades of color alternate each other thus giving the animal the banded appearance.

The animal generally attains the length of 15—20 cm.

This is a rather rare species. I have collected it from the Tokyo Bay and Bay of Ise.

Is known under the names of "ushiyebi" or "kurokumayebi."

This species is very intimately allied to *P. ashiaka*, so that these two species are often confounded together. The length of the flagellae of the first antennae, length of the rostrum, petasma, color, etc. distinguish these two species.

## PENAEUS AFFINIS.

(Pl. IV, 1)

*Penaeus affinis*, M-Edw., Hist. Nat. Crust (1837); Sp. Bate, Ann. Mag. Nat. Hist. 5 series viii, pp. 179—180, Pl. XII, fig. 6 (1881).

*Penaeus monoceros*, Ortmann, Zool. Jahrbuch. Abth. Syst. p. 450 (1890).

The shell for the most part smooth and thick. The carapace and the pleonic segments posterior to the fourth segment have more or less small, irregular grooves in which minute setae are growing. The rostrum nearly straight, but in the female it is a little elevated at the anterior end. It is 8 or 9 dentate, toothed to its tip. There is a faint kiel at the median longitudinal line of the carapace and also between the hepatic tooth and the posterior margin of the carapace. The second joint of the first three pairs of pereiopoda is respectively armed with a spine. Males have a blunt tooth on the fourth joint of the fifth pair of pereiopoda. On the peduncle of pleopoda, there is a shallowd groove, occupying about 1/5 of the breadth of the external side of the peduncle. In such a groove, we find short setae. In males the sixth pair of pleopoda has a tubercle on the peduncle. The telson has many, shallow, longitudinal grooves, grown with setae.

The central plate of the thelycum (Pl. VII, 5 A) is low and small,

has a small pointed tubercle near the anterior margin. The lateral plates are small and flat. The seminal receptacle is divided into two cavities by a median septum (Pl. VII, 5 B). The ostia to these cavities are narrow and are found with difficulty. Moreover, the first joint of the fourth pair of pereiopoda extends towards the median line and borders the anterior margin of the thelycum.

The petasma (Pl. VII, 5) is tube-like. The anterior end of the inner lamina is kidney-shaped, while that of the outer lamina is turned outward. The posterior end of the inner lamina is turned inward.

We find a small, flat, somewhat oval spermatophore in the dilated, extreme end of the ductus ejaculatorius. There is no appendage on the spermatophore; but we find a slender white mass of secretion in the dilated portion. This white mass of secretion is often found attached to the central plate of the thelycum after copulation (Pl. VII, 5 C). Hence this white mass seems to be homologous to the appendage of spermatophores in other species.

The color of the animal is yellowish or pale green with greenish dots. The margin of the rhipidura is rich green.

Females attain the size of 12 cm., males 9 cm. Females receive spermatophores from the middle of July. They spawn from August till October.

The shell of young animals is quite naked, till they grow to the length of about 6 cm. As the animal grows old, setae appear in grooves or hollow parts of the shell.

This species inhabits shallow parts of the bay or inlet only, always in the depth of less than 20 metres.

It is rather widely distributed from the Tokyo Bay to Formosa; but as its distribution is restricted to very shallow parts only, its catch is not abundant.

This species is often confounded with other different species such as *Penaeus monoceros*, *P. velutinus*, etc, as the original description is in-

complete. This species coincides with Spence Bate's figures and description of the type specimens of M-Edward, preserved in the Museum of the Jardin des Plantes.

There are many closely allied species.

## PENAEUS INCISIPES.

(Pl. IV, 2)

*Penacus incisipes*, Sp. Bate, Challenger Rep. Crust. Macrura (1888).

The surface of the shell rough with irregular, shallow and setae-grown grooves. The rostrum nearly straight and generally 8 dentate above. In female specimens, the tip of the rostrum is a little bent upwards. Continuous to the root of the rostrum, there is a little elevation in the median line of the carapace. Besides this, there is a faint elevation between the hepatic tooth and the posterior margin of the carapace. The first pair of pereiopoda bispinose and the second and third pairs unispinose. In males, there is a tooth on the fourth joint of the fifth pereiopoda. In the pleon there is a kiel in the dorsal median line from the first somite to the last; but it is faint in the first-third somites. An incision in the pleuron of the first somite. The incision is marked in males. The peduncle of the pleopoda thickly beset with setae. The sixth pleopoda has a slight protuberance on its peduncle in males. The tail segment is grooved.

The central plate of the thelycum (Pl. VII, 6 A) is laterally compressed. It is a little expanded at the anterior end. Each lateral plate forms a crescent-shaped ridge at the external margin. The first joint of the fourth pereiopoda is expanded and meets the lateral margin of the central plate of the thelycum. The wall of the seminal receptacle is thick and calcified. The receptacle is divided into two cavities by a median septum.

The anterior end of the inner lamina of the petasma is very large and covers the anterior end of the outer lamina (Pl. VII, 6).

The color is light red or light brown in adult animals and greyish green in immature animals.

The animal generally reach maturity when it is about 12 cm. in length. Well grown specimens measure 18 cm. in length.

The spawning season is from summer to autumn.

This species is very widely distributed. It is found from the Tokyo Bay to the southern end of our empire and also along the lower half of the coast of the Japan Sea.

It is known under the names of "yoshiyebi," "hōzōyebi," "unadoriyebi," etc.

This species inhabits the shallow water like *P. affinis*.

*P. monoceros* (*P. ensis*) of de Haan is probably this species; but the author describes that his species is armed with 3 pairs of spines on the tail segment. *P. incisipes*, *P. affinis*, *P. monoceros*, etc are often confounded.

## PENAEUS JOYNERI.

(Pl. V)

*Penaeus Joyneri*, Miers, On a Coll. of Crust. from the Malayasian Regions, Ann. Mag. Nat. Hist. 5 series v p. 458 (1880).

The shell thin, soft and with irregular setae-grown grooves. The rostrum slightly curved upward at the anterior end, 7 dentate. Its anterior portion remains toothless and the toothless portion is subequal in length to that of the eye. A faint median kiel in the carapace is continuous to the rostrum and there is moreover a faint ridge between the hepatic tooth and the posterior margin of the carapace as in *P. incisipes*. The second joint of the first to the third pereiopoda unispinose. In males, the spine of the third pereiopoda is enormously developed

and is provided with a pointed cap at the apex. The spine is longer than the second joint of the same pereiopoda. Males have moreover a tooth on the fourth joint of the fifth pereiopoda. The fourth joint of the fourth pereiopoda is broad and forms a tooth-like projection. In the pleon there is a dorsal median kiel. It is rather faint in the first to the third segments. The pleuron of the first somite has an incision which is more marked in males than in females. The peduncle of the pleopoda nearly naked, leaving a narrow setae-grown groove. In males the sixth pleopoda has a tubercle on its peduncle.

The central and the lateral plates of the thelycum (Pl. VII, 7A, 7B) are almost equal in length. The larger part of the central plate is vertical, but it is horizontally expanded at the posterior end. Lateral plates are convex and their inner margin runs along the entire length of the central plate. Hence the ostia to the seminal receptacle are wide and conspicuous. Females receive by copulation a pair of milky white, leaf-shaped bodies on the thelycum (Pl. VII, 7 C). These peculiar bodies have no direct connection with the spermatozoa, but are attached to the posterior, broad portion of the central plate by means of a glutinous substance. This species does not form spermatophores, but the spermatozoa in the seminal receptacle form a nearly solid mass.

The petasma (Pl. VII, 7) is complicated. The anterior end of its inner lamina long and bent backward.

The vas deferens long and coiled several times. The ductus ejaculatorius is thick walled and its end, next to the external opening is swollen and is divided into three partially separated chambers.

The color of the animal is pale yellow with numerous small greenish spots. The external margin of the rhipidura greenish.

The animal generally reaches the size of 13 cm. The largest male I examined was 14 cm, the largest female 15 cm.

The animal copulates from the beginning of June to the end of

September.

Inhabits the shallow sandy bottom, not deeper than 20 metres. In autumn this species is found to form large shoals and migrates in a bay.

Is distributed in the Pacific coast of our country from the Tōkyō Bay to Kūshū.

Feeds chiefly on microscopical algae.

This species is one of the very important prawns. It is known under the names of "shibayebi," "ohzoyebi," etc.

## PENAEUS INTERMEDIUS Nov. Spec.

The shell with shallow, irregular and setae-grown grooves. The rostrum is straight, 9 dentate, toothed to the apex and is equal in length to the peduncle of the first pair of antennae. Continuous to



the rostrum, there is a low kiel running to the hind margin of the carapace. The first pair of pereiopoda bispinose, the second and third pairs unispinose. The first joint of the fourth pereiopoda is expanded and meets the lateral sides of the central plate of the thelycum. The tail segment is grooved and is armed with three pairs of long movable spines.

The thelycum is much like the same organ of *P. incisipes*, but the external ridge of the lateral plate is low and inconspicuous. The cavity of the seminal receptacle is divided into two by a median septum.

Only two female specimens are known from the province of Tosa.

They are 12 cm. in length.

This species is closely related to the group of *P. affinis;* but differs from it by the armature of the tail segment.

## PENAEUS TENELLUS.

(Pl. VI, 2)

*Penaeus tenellus*, Sp. Bate, Challenger Rep. Crust. Macrura (1888).
*Penaeus crucifer*, Ortmann, Zool. Jahrbuch. Abth. Syst. (1890).

The shell smooth and naked. The rostrum shorter than the peduncle of the first pair of antennae, 8 dentate. The gastric tooth wanting. No median kiel in the carapace. From the orbit, a longitudinal fissure runs towards the posterior margin, but disappears before reaching it. The second joint of the first and second pairs of pereiopoda unispinose. The pleon is carinated from the fourth somite backward. The tail segment has a shallow and narrow channel.

The central plate of the thelycum (Pl. VII, 8 A) is large, lozenge shaped and is longitudinally grooved. The lateral plates are united into one piece. The seminal receptacle consists of two small entirely separate cavities (Pl. VII, 8 B).

The petasma is thin and broad, has a pair of transverse horns (Pl. VII, 8).

The color is light brown with numerous brown spots which form indistinct bands. The antennae, pleopoda and the margin of the rhipidura are reddish.

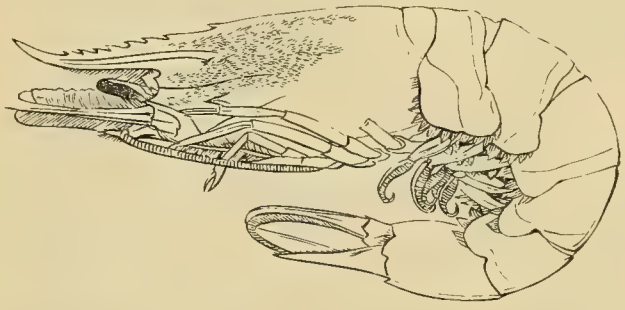
The female specimen attains the length of 7.5 cm., while the male is a little smaller.

This species is found rather abundantly in the Inland Sea. Roughly speaking it is distributed along the lower half of our empire.

Known under the names of "sakurayebi," "akazayebi," "gaseyebi," etc.

## PENAEUS CORNUTUS. Nov. Spec.

The shell smooth and thick. The upper part of the carapace beset with setae. The rostrum nearly straight in males, but in females it is elevated at the apex and is longer than in males. It is nearly equal in length to the scaphocerite. 8 dentate. Continuous to the rostrum, there is a faint kiel on the carapace. From the orbit a longitudinal fissure runs about 2/3 the length of the carapace. There is a kiel from the fourth pleonic somite backward. The tail segment is furrowed. The second joint of the first and second pairs of pereiopoda unispinose. The fifth pereiopoda longest.



The central plate of the thelycum (Pl. VII, 9 A) is large and oblong. The lateral plates are coalesced together. The seminal receptacle consists of two quite separate cavities. They are small and their walls are calcareous.

The anterior end of the petasma is divided into two horn-like processes (Pl. VII, 9).

The male attains the length of about 11 cm., the female about 14 cm.

Found in the Bay of Ariake, Kūshū.

## PENAEUS CURVIROSTRIS.

(Pl. VI, 4)

*Penaeus curvirostris*, Stimpson, Proc. Ac. Nat. Sc. Philadelph. p. 113 (1860); Ortmann, Zool. Jahrbuch. Abth. Syst. p. 451 (1890).

*? Penaeus barbatus*, de Haan, Fauna Japon. Crust (1849).

*? Penaeus granulatus*, Haswell, Proc. Lin. Soc. N. S. Wales iv (1879).

*Penaeus anchoralis*, Sp. Bate, Challenger Rep. Crust. Macrura (1888).

The whole surface of the shell is covered with setae. The rostrum is straight and short in males; but in females it is a little elevated at the apex and is subequal in length to the peduncle of the first antennae. Generally 8 dentate. Continuous to the rostrum there is a faint kiel on the carapace. The antero-inferior corner of the carapace is more or less pointed; but it does not form a tooth. The second joint of the first two pairs of pereipoda spined. The pleon is kieled from the second somite backward. The tail segment is grooved and is armed on each margin with three small spines.

The central plate of the thelycum is lozenge-shaped and concave. The lateral plates are short and small, united at the median line (Pl. VII, 10 A). The seminal receptacle consists of two membranaceous secs (Pl. VII, 10 B), having narrow slits for the opening. After copulation the central plate is covered with an amorphous gum-like substance (Pl. VII, 10 C).

The petasma is T shaped (Pl. VII, 10). The vas deferens is slender and has several coils. The ductus ejaculatorius becomes gradually thick towards the genital opening. Smermatozoa are top-shaped. Some fifty or more spermatozoa are grouped in an ellipsoidal sac or spermatophore. In this species a great many such sacs or spermatophores are transferred to females by copulation. Males have ripe spermatozoa whole round a year.

The color is light brown or greyish brown.

The female specimen attains the length of 12.5 cm., the male 10.5 cm. The female reaches maturity when it is 7.5 cm. in length and the

male when it is 5.5 cm.

The spawning season is from the middle of June to August.

This species is found along the Pacific coast of our country, from the Bay of Awomori to Kagoshima. Captured in large quantities and used as food and bait.

*P. granulatus* Haswell is very closely allied to this species and is most probably synonimous. The male specimen of *P. anchoralis* Sp. Bate[illegible] is identical with this species; but the female (Pl. XXXV, I''') is not.

Known under the names of "saruyebi," "kosakuyebi," "atamabuto," etc.

## PENAEUS LAMELLATUS.

(Pl. VI, 1)

*Penaeus lamellatus*, de Haan, Fauna Japon. Crust. (1849)

The body plump and is covered with setae. The rostrum short, broad and straight, equal in length to the eyes. 9—10 dentate. No dorsal carina on the carapace. The antero-inferior corner of the carapace is toothed. The second and third joints of the first pereiopoda and the second joint of the second pereiopoda unispinose. A pair of spines between the second pair of pereiopoda. The pleon is kieled from the second somite backward. The tail segment so long as the sixth pleopoda, not distinctly furrowed. It is armed on each side with one rigid and three movable spines.

The central plate of the thelycum is provided with a spine, projecting anteriorly from the front margin. At each end of the lateral plate a blunt protuberance is found.

The petasma (Pl. VII, 12) is not bilaterally symmetrical. The left half is longer and its distal portion is broader than that of the right half.

The color of the animal is beautifully variegated. Most appendages are crimson red.

The animal is about 6 cm. in length.

This species is widely distributed from Hokkaido to Kūshū, but it is few in number.

## PENAEUS VELUTINUS.

(Pl. VI, 3)

*Penaeus velutinus*, Dana, U. S. Expl. Exp. xiii Crust (1852), Sp. Bate, Challenger Rep. Crust. Macrura (1888).

*Penaeus affinis*, Proc. Zool. Soc. p. 304 (1878).

The whole surface of the shell is covered with setae. The rostrum is nearly straight or a little elevated near the anterior end. It is a little shorter than the peduncle of the first antennae. 7 or 8 dentate, toothed to the apex. The carapace not carinated. Antero-inferior corner of the carapace pointed and forms a tooth. The second gnathopoda and the first and second pereiopoda have a spine on the second joint. The first pereiopoda has also a spine on the third joint. A pair of long spines between the second pereiopoda. In females the first joint of the fourth pereiopoda has an inward outgrowth. The pleon is kieled from the second somite backward. The sixth somite and the tail segment long. The tail segment and the sixth pleopoda equal in length.

The central plate of the thelycum (Pl. VII, 11 A) has an ellipsoidal protuberance. The lateral plates are coalesced. The seminal receptacle consists of two small widely separated cavities (Pl. VII, 11 B).

The petasma (Pl. VII, 11) is not symmetrical, the left half is longer and its posterior end is bent towards the right side while its anterior end has many scale like processes.

The color of the animal is pale red or greyish red.

This species attains the size of about 10 cm.

There are very closely allied species, but as their specimens are ew in number, I shall omit their description.

This species is known under the name of "akayebi." It is very abundantly captured in the Inland Sea, Bay of Ise, etc in summer.

Tokyo, April 4, 1900.

# EXPLANATION OF PLATES.

## Pl. I.

1. Penaeus canaliculatus. (young female)
2. „ „ (female)

## Pl. II.

1. Penaeus monodon. (male)
2. „ latisulcatus. (female)

## Pl. III.

1. Penaeus ashiaka. (male)
2. „ „ (female)

## Pl. IV.

1. Penaeus affinis. (ripe female)
2. „ incisipes. (male)

## Pl. V.

1. Penaeus Joyneri. (female)
2. „ „ (male)

## Pl. VI.

1. Penaeus lamellatus. (male)
2. „ tenellus. (female)
3. „ velutinus. (female)
4. „ curvirostris. (female)

## Pl. VII.

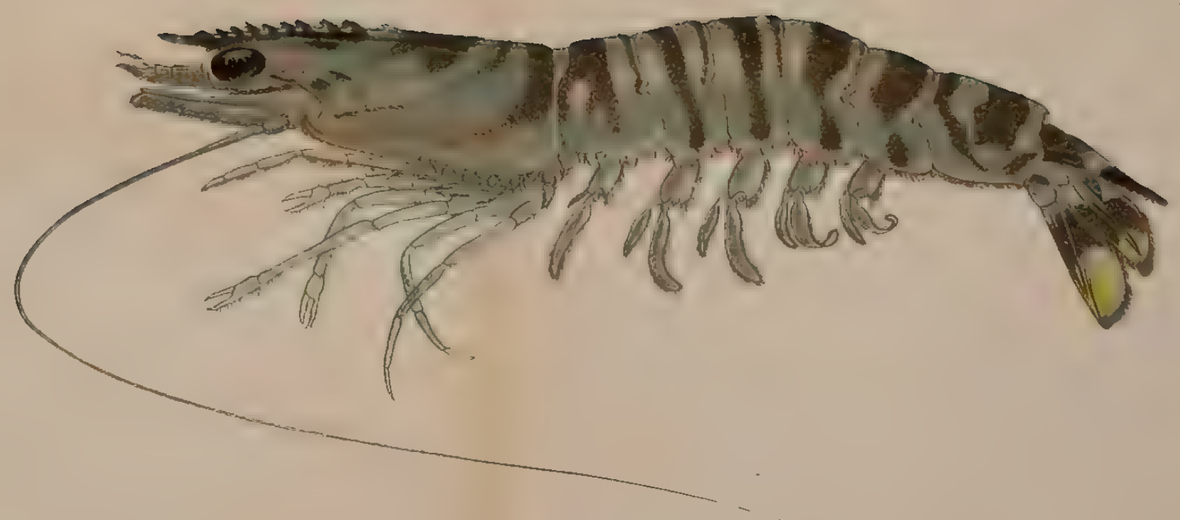
1—12. Petasma, represented from the dorsal, ventral and lateral sides.

1A—11B. Thelycum or receptaculum seminis. A. External appearance. B. The same, seen from the internal side, after peeling off the crust. C. The same, showing a peculiar body transferred to it by copulation.

## Pl. VIII.

1. Nauplius, shortly after hatching. 2A.
2. „ with 7 appendages. 2A.
3. Metanauplius. 2A.
4. Zoea. 2A.
5. Cephalic portion of a Zoea. 2D.
6. „ „ „ „ Metazoea. 2B.
7. Metazoea. 2A.
8. Cephalic portion of a young prawn. 2A.

1.



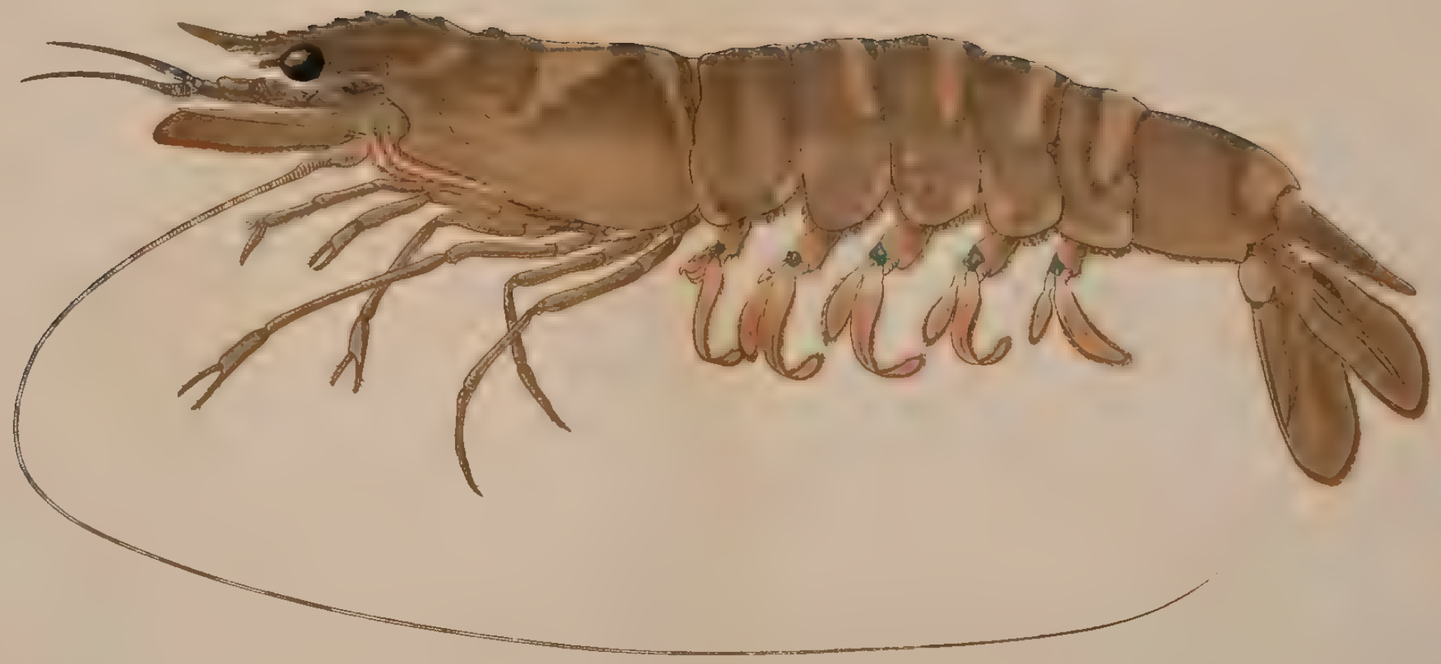
2.



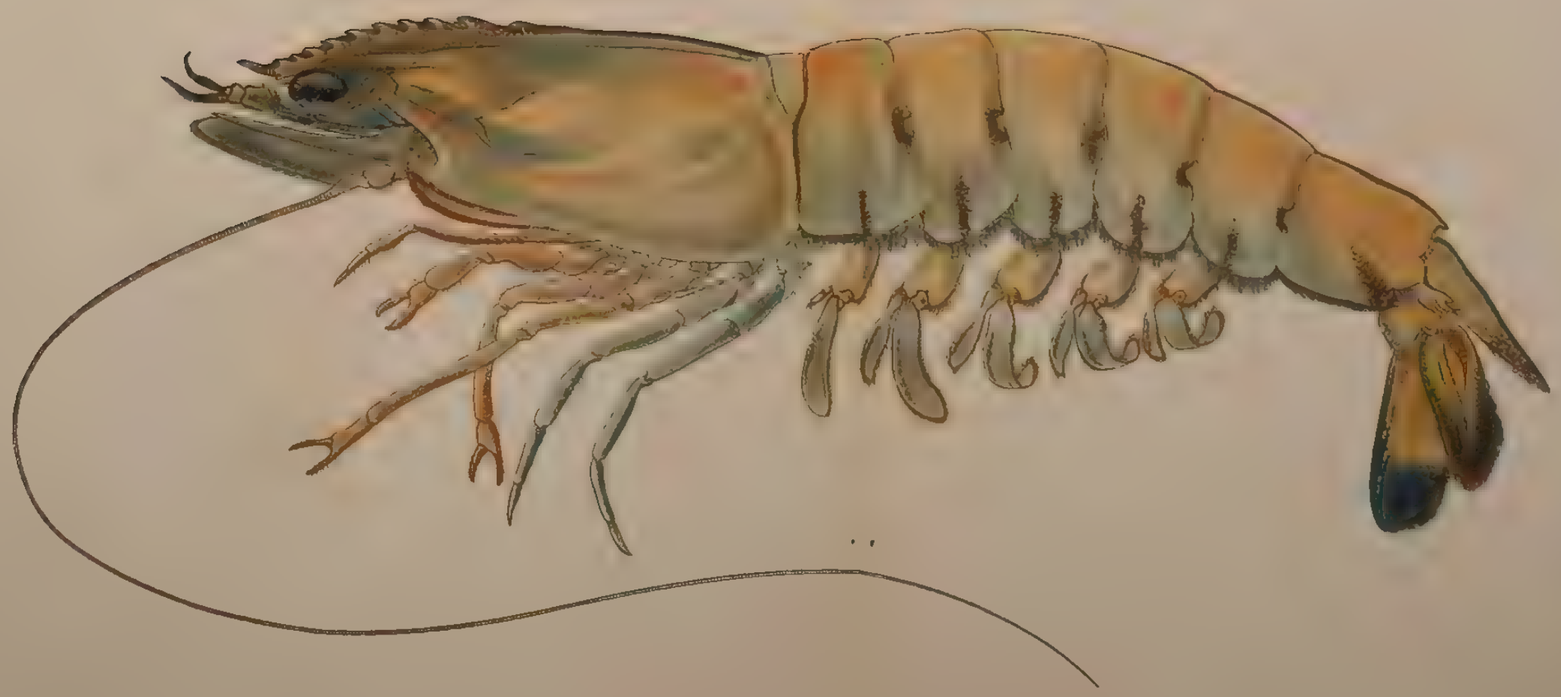
1. 2. PENÆUS CANALICULATUS
クルマエビ

Lith. E. Koshiba Shigashi-matsushita-cho Tokyo Japan

1.



2.



1. PENÆUS MONODON ウシエビ　2. P. LATISULCATUS フトミゾエビ

Lith. E. Koshiba Shigashi-matsushita cho Tokyo Japan

1



2



1,2. PENÆUS ASHIAKA
クマエビ

1



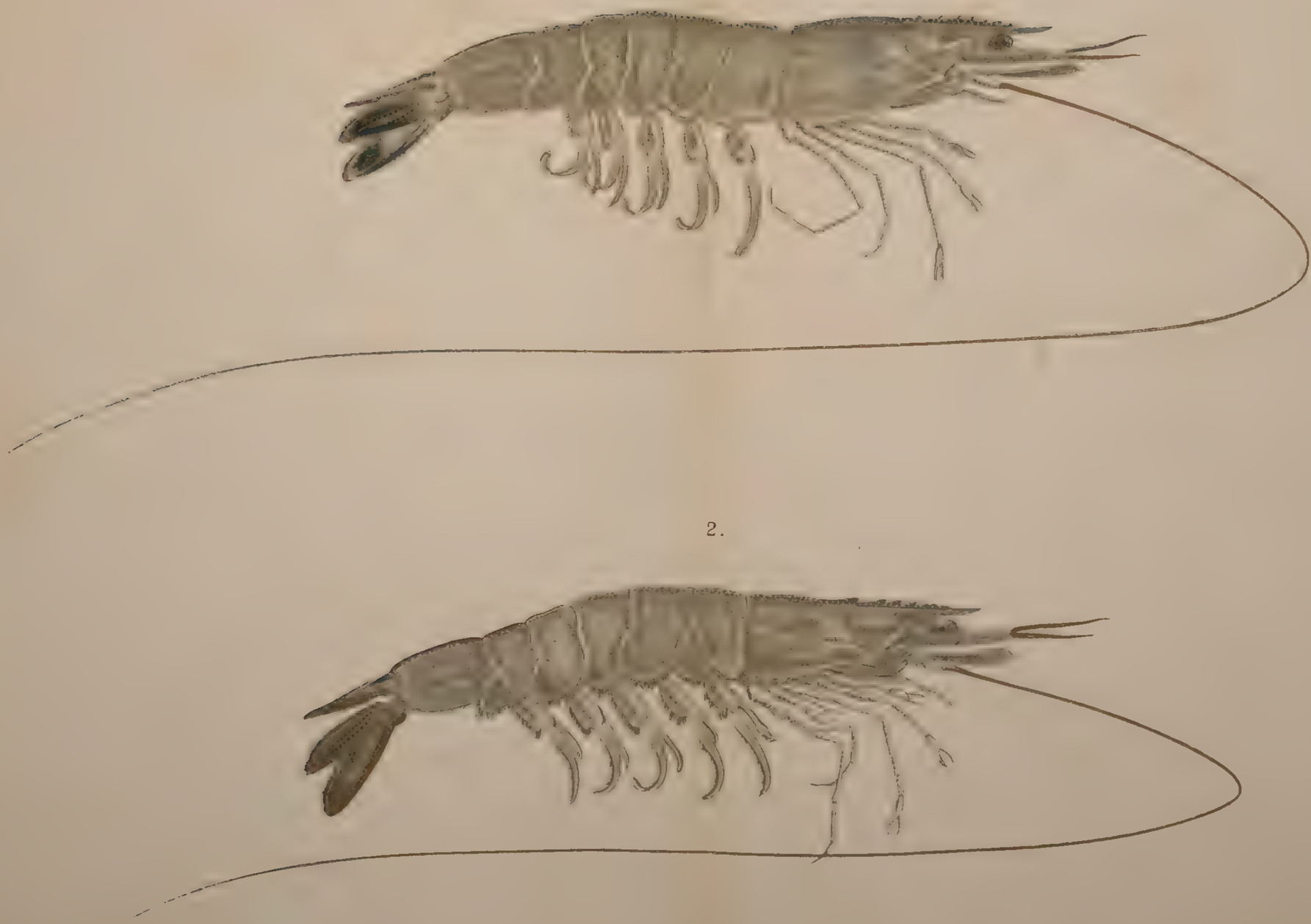
2



1. PENÆUS AFFINIS.
モエビ

2. P. INCISIPES.
ヨシエビ

1.

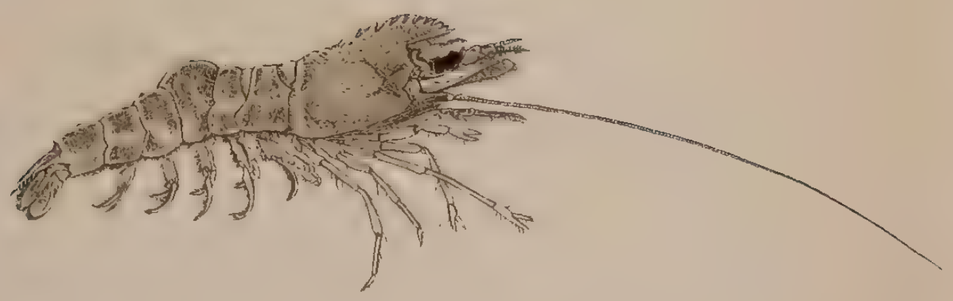


2.

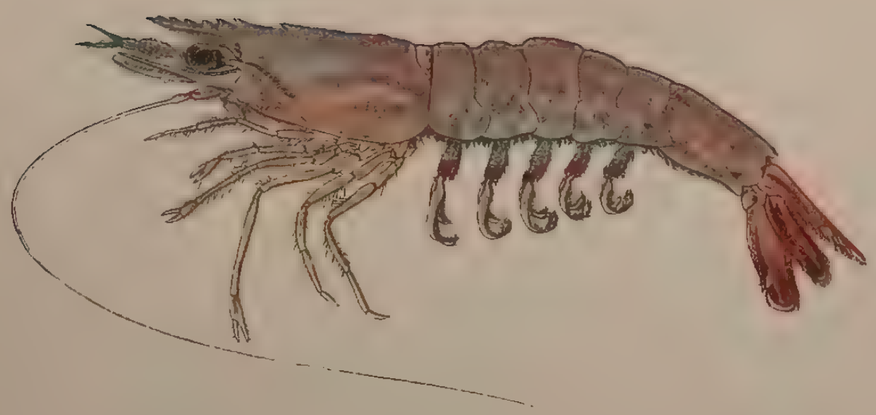
1. 2. PENÆUS JOYNERI
シバエビ

Lith E Koshiba Shigash.-matsushita-cho Tokyo Japan

1



2



1. PENÆUS LAMELLATUS.
ホソコクエビ

2. ,, VELUTINUS.
アカエビ

3

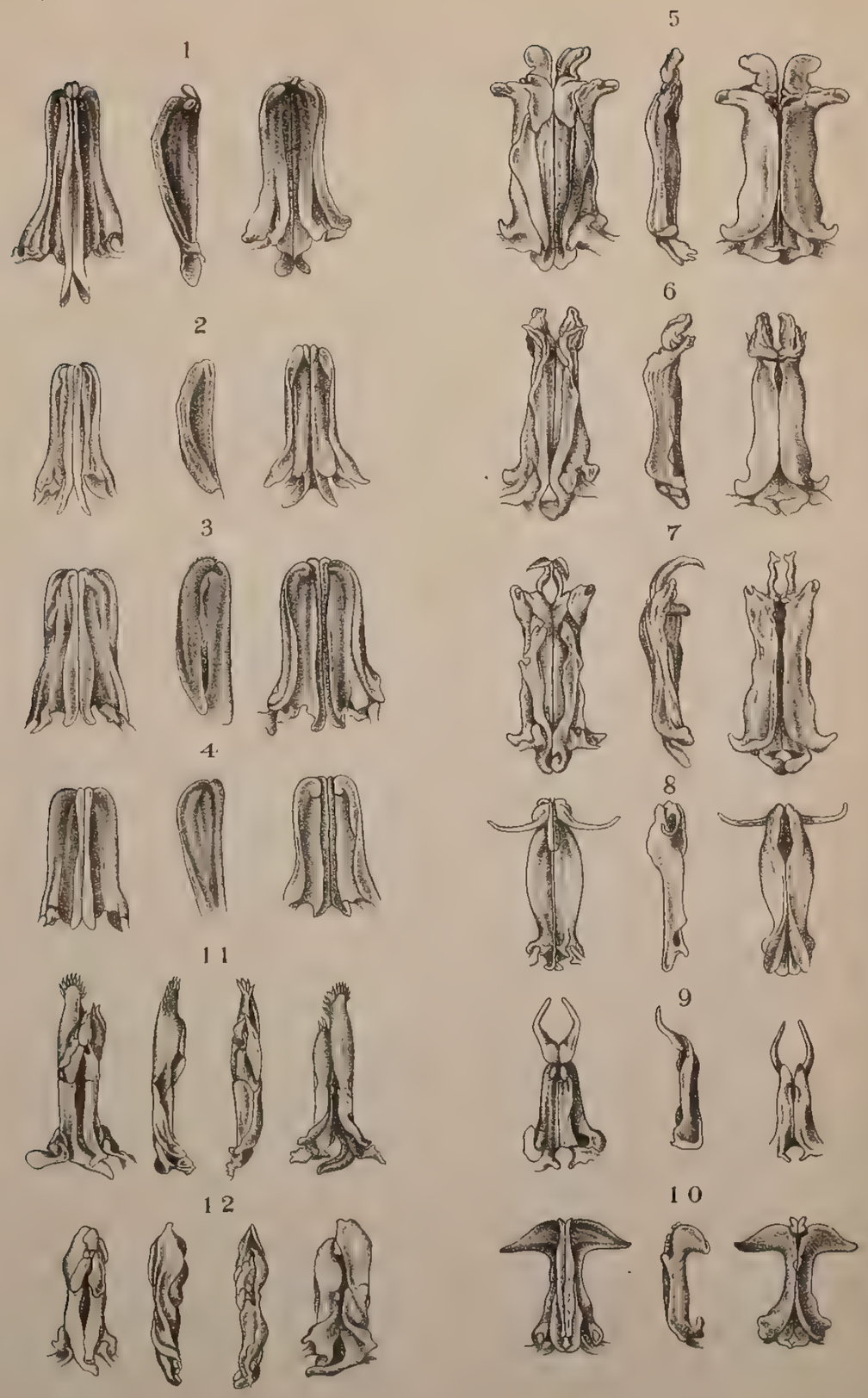


4



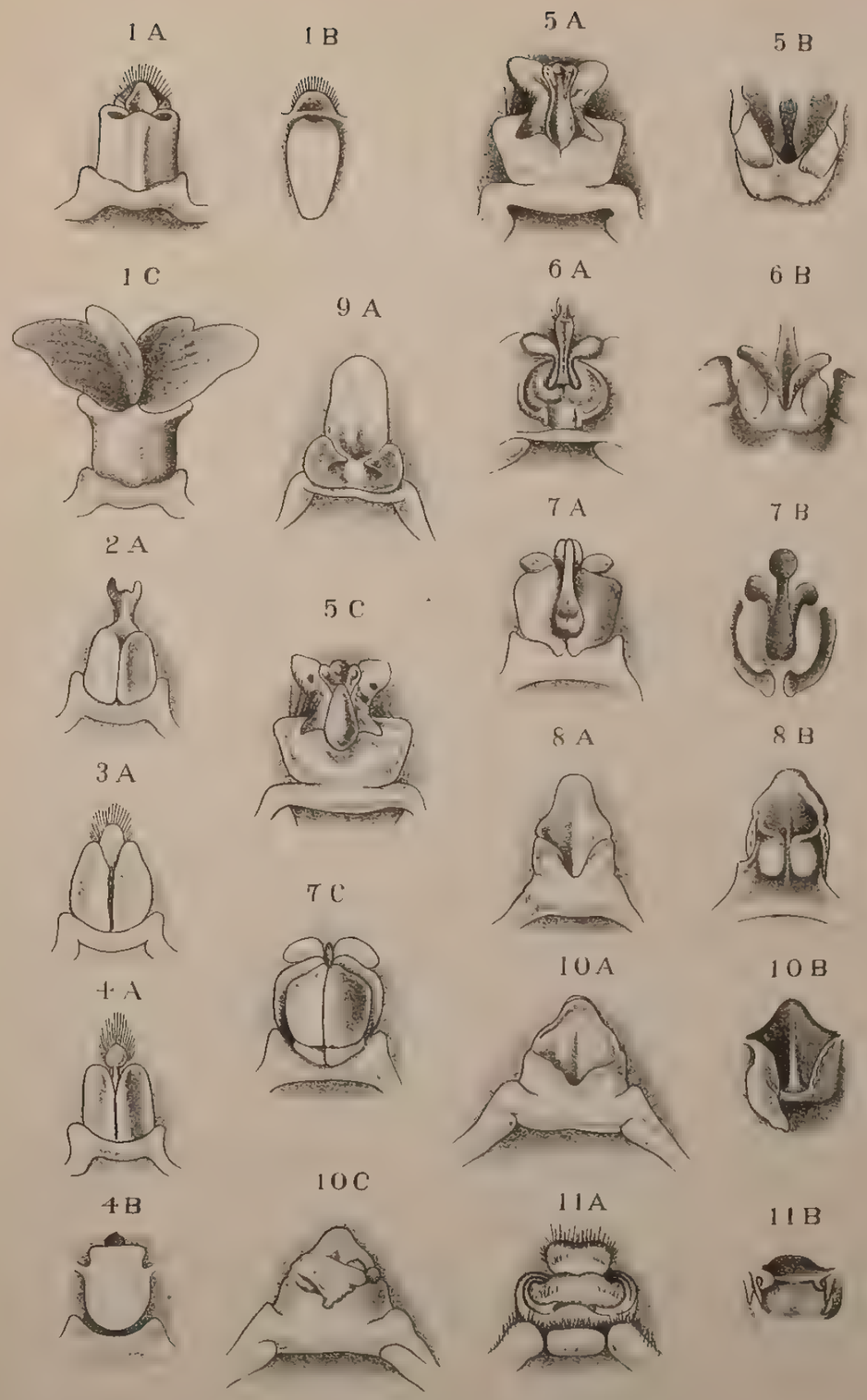
3. PENÆUS TENELLUS.
サクラエビ

4. ,, CURVIROSTRIS.
サルエビ



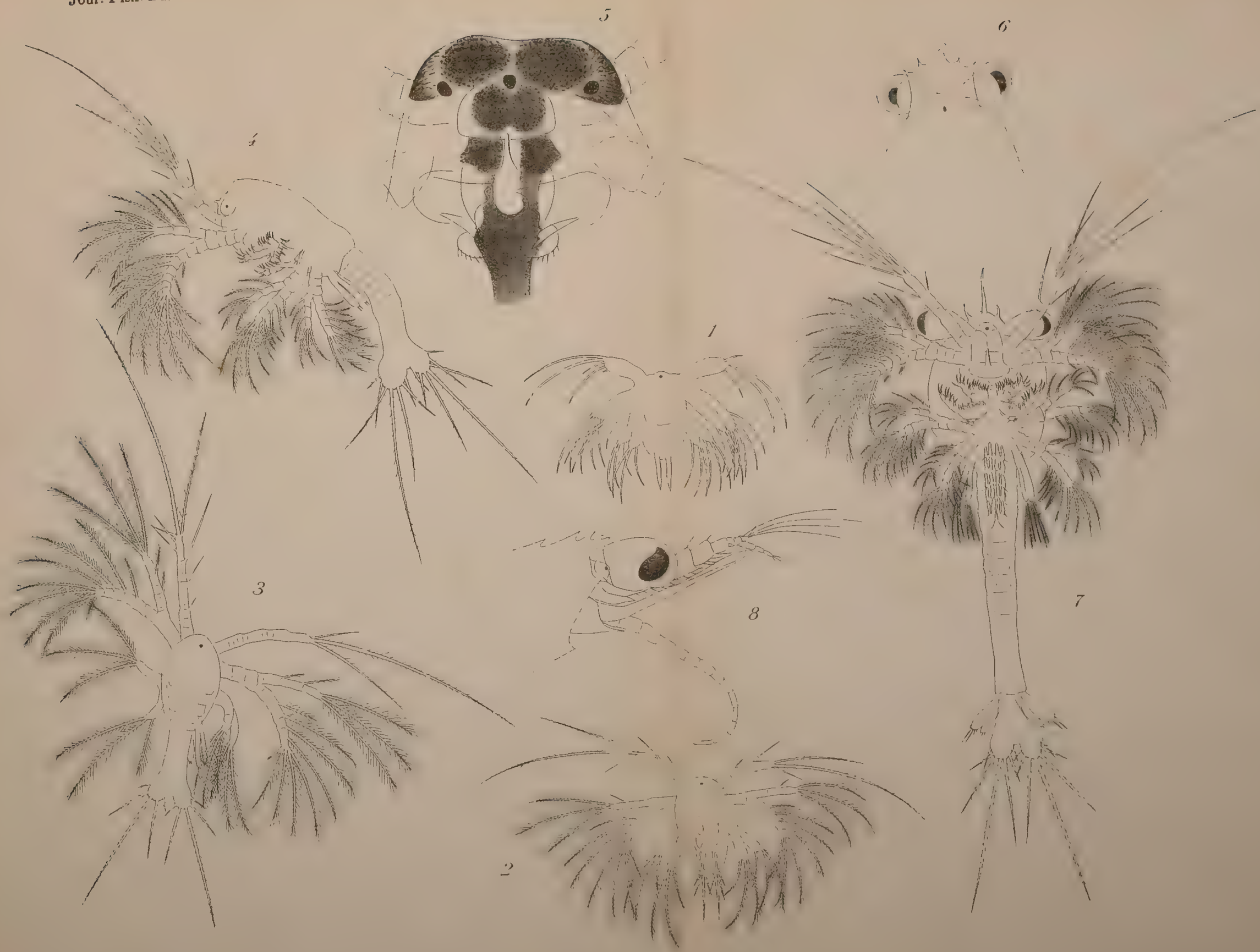

Petasma 雄交接器

1. P. canaliculatus クルマエビ
2. P. latisulcatus フトミゾエビ
3. P. monodon ウシエビ
4. P. ashiaka クマエビ
5. P. affinis モエビ
6. P. incisipes ヨシエビ




Thelycum 雌交接器

7. P. joyneri シバエビ
8. P. tenellus サクラエビ
9. P. cornutus チグゴエビ
10. P. curvirostris サルエビ
11. P. velutinus アカエビ
12. P. lamellatus ホッコクエビ



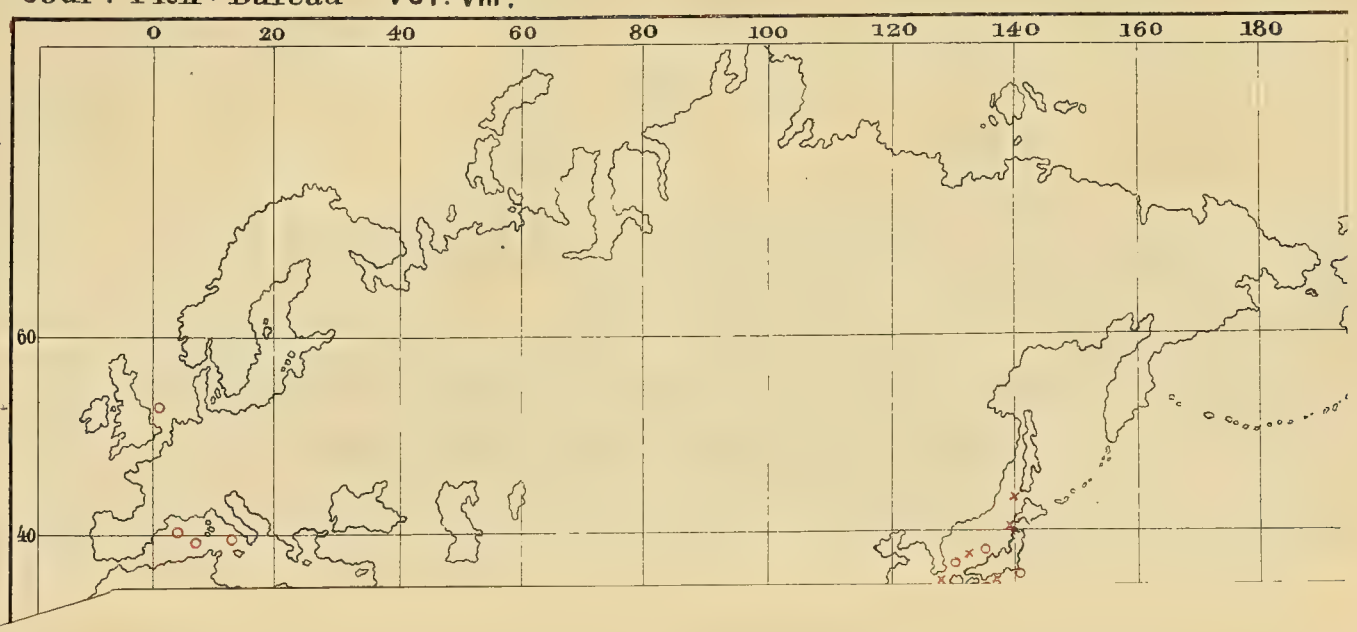

生發ノ關ビ泊まるく

## Distribution of Penaeus.

○ indicates species of Group I a

× 〃 〃 〃 〃 II

Jour. Fish. Bureau VOl. VIII.

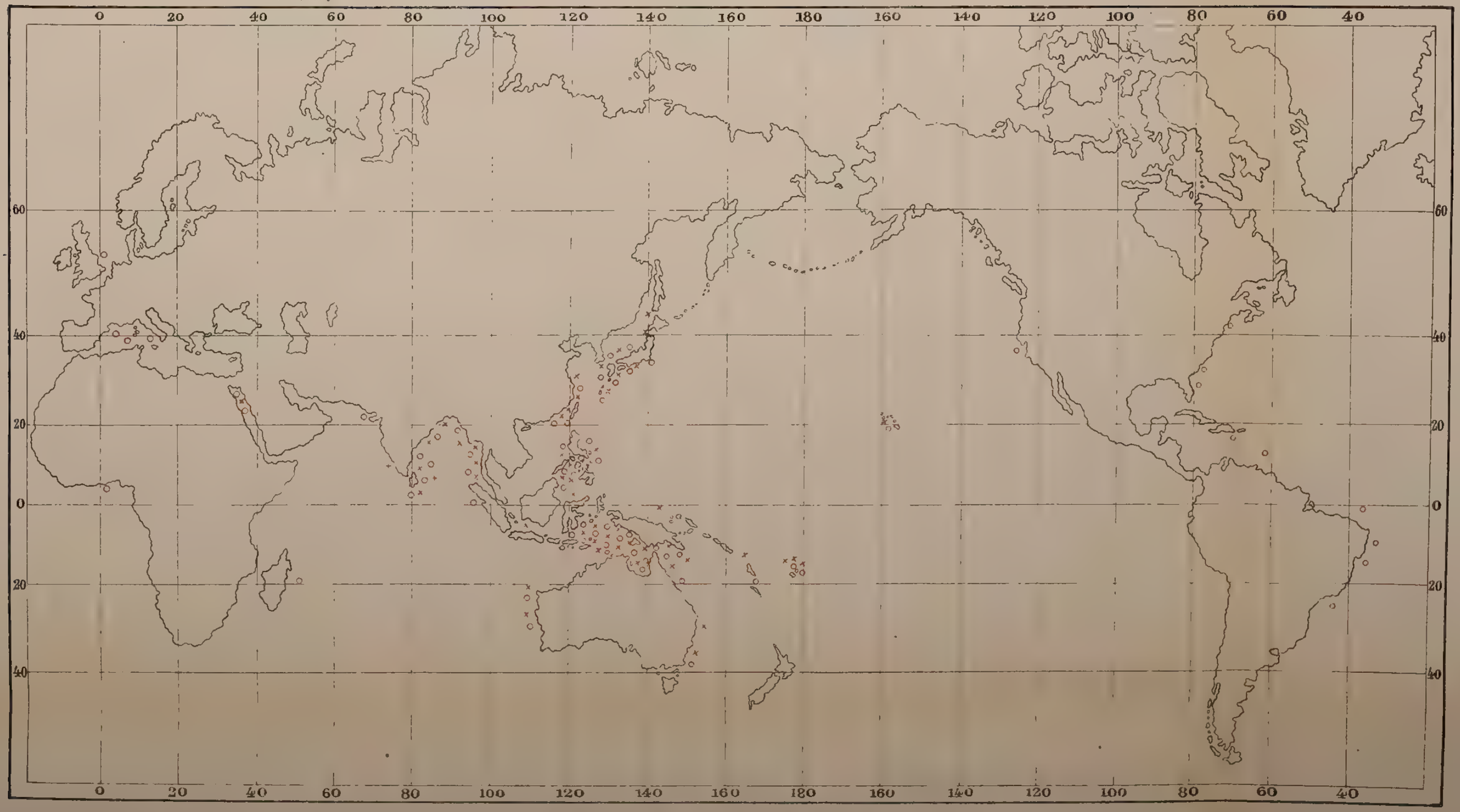


# Distribution of Penaeus.

○ indicates species of Group I and allied forms.

× " " " " II " " "

Jour. Fish. Bureau VOL. VIII. Pl. IX.




一及二頁ヲ見ヨ

## くるまえび屬ノ分布

赤環ハ甲組ノ種類

赤十字ハ乙組ノ種類

當ル溝アリテ其中ニ細毛生ス、雄第三脚ノ棘ハ同脚第二節ノ長ヨリ長シ　しばえび

(ろ)

第一對ノ脚ノ基部ニ二棘アリ、第二及ヒ第三對ノ脚ニハ各々一棘アリ、貯精腔ハ隔壁ニヨリ左右二房ニ分タル、尾環節ニ棘アリ

(ハ)

(八) 殻皮ニハ不規則ナル溝アリテ其中ニ細毛生ス、舶狀突起ノ齒九　とさえび

第一、第二對ノ脚ノ基ニ各々一棘アリ、貯精腔ハ左右二房ニ分タレ、互ニ相接着セス、甲ニ裂罅アリ

(九) 細毛生セス、舶狀突起短クシテ僅ニ眼ヨリ先ニ出ツ、胃部ノ上ニアル鋸齒ナク脚細シ　さくらえび

(十) 甲ノ前上部ニ細毛アリ　ちくごえび

(仁)

頭胸部前下緣ニ棘アリ、第一、第二對ノ脚ノ基ニ各々一棘アリ、第二腹環節ヨリ背面正中線ニ隆起アリ、尾環節両側ニ棘アリ、貯精腔ハ互ニ相接着セサル左右ノ二房ヨリナル、全体細毛密生ス

(に)

雄交接器ハ左右相稱、第二對ノ脚ノ間ニハ棘ナシ

(十一) 尾環節ノ棘極メテ小ニシテ肉眼ニテ認メ難シ、第三及第五對ノ脚殆ント同長ナリ　さるえび

(ほ)

雄交掛器ハ左右不同、第二對ノ脚ノ間ニ一對ノ棘アリ、尾環節ニハ可動的棘一對ト不動的棘一對トアリ

(十二) 舶狀突起短クシテ僅ニ眼ヨリ先ニ出テ且ツ其幅廣シ　ほつこくえび

(十三) 第六腹環節及尾環節共ニ長クシテ第六腹肢ノ長サニ均シ、雌ノ第四脚第一節延大セリ　あかえび

失ス、貯精腔左右両辨ハ中央ニテ相接シ、且ツ前方ニ於テ中央辨ト接ス、其接合線Y字形ヲナス、雄交接器外緣先端ハ曲リテ尖リ且ツ若干ノ極メテ微細ナル鋸齒ヲ有ス、然レトモ此部分ハ隱レテ見ヘス、舳狀突起上側ノ鋸齒七或ハ八

（乙）うしえび

舳狀突起下側ニ鋸齒ナシ、貯精腔ハ左右ノ二房ヨリナル、体長六寸ニ達スルモノ稀ナリ、精包ニ附器ナシ、輸精管細長クシテ屈曲多シ、体ノ表面ニハ概ネ毛アリ、稀ニハ平滑ニシテ毛ナシ

（波）頭胸部正中線ニ微ナル隆起アリ、頭部前下緣及ヒ尾環節両側ニ棘ナシ

（い）第一、第二、第三對ノ脚ノ基ニ各々一棘アリ、雄ニ於テハ第五對ノ脚ノ第四節ニ隆起アリ、第一腹環節ノ下緣ニ切レ込ミアリ、第六對腹肢ノ柄ニ小突起アリ、雌ノ貯精腔ハ内外壁共ニ石灰ヲ含ミテ堅ク、且ツ中央ノ膈壁ニヨリ左右ノ二房ニ分タル、殻皮ニハ不規前ナル溝アリ、其中ニ細毛生ス、雄交接器内葉ノ前端著ルシク發達シ又其後端内方ニ曲リテ相接ス

（五）雌ノ第四脚第一節延大シテ貯精腔前部ヲ蔽フ貯精腔左右両瓣ハ畧ホ扁平ナリ、雄交接器内葉先端ハ餘リ大ナラス、外葉先端ハ左右ニ開ク、舳狀突起ニハ其先端ニ至ルマテ鋸齒アリ、其數八或ハ九、第一乃至第四腹環節ハ無毛、腹肢ノ柄ニハ極メテ細キ溝ノ中ニ細毛生ス、其溝ノ幅ハ腹肢ノ横幅ノ凡ソ五分一ニ當ル

（六）もえび

雌ノ第四脚第一節延大セリ、貯精腔側辨ハ其外緣隆起セリ、雄交接器内葉先端甚ダ大ナリ、舳狀突起ニハ稍其先端ニ至ルマテ鋸齒アリ、其數八、全体ニ細毛密生ス、只細ク且ツ不規則ナル隆起ノ處ニ毛ナキノミ、腹肢ノ柄ノ全面ニ細毛生ス

（七）よしえび

貯精腔左右両辨ハ穹隆セリ、其外面ニハ交接ノ際白色葉狀ノモノ附着ス、雄交接器内葉前端ハ細長ク且ツ背面ニ向ヒテ曲レリ、舳狀突起先端ハ細クシテ鋸齒ナシ、其數通常七、腹肢ノ柄ニハ其横幅ノ凡ソ三分一

# 本邦産くるまえび類檢索表

(甲) 舶狀突起下側ニ鋸齒アリ、貯精腔內壁ハ薄膜ヨリナリ、只一房ヨリナル、体ノ表面ニ毛ナシ、体長八寸以上ニ達ス、精包ニ附器アリ、輸精管太ク短ク、屈曲スルコト少シ、第三脚最長

(伊) 舶狀突起下側ノ鋸齒一、尾環節ニ三對ノ小棘アリ、頭胸部正中線ニ溝アリ、舶狀突起ノ両側ニ沿フテ走ル溝ハ頭胸部ノ後端ニ達ス、脚肢太ク、雄交接器內葉後端ノ突起長クシテ外方ニ向ヘリ、第一第二對ノ脚ノ基ニ棘アリ

(一) 頭胸部正中線ノ溝ハ其両側ノモノト幅畧同シ、貯精腔左右ノ辨ハ中央ニテ癒着シ、腔ノ孔ハ横ニ開ク、精包ハ羽狀ヲナセル附器ヲ有ス、雄交接器ノ外緣ハ太ク、其內葉ノ先端ハ長クシテ肉質ノ突起ヲ以テ終ル、体ニハ其長軸ニ直角ヲナス所ノ多數ノ條紋アリ舶狀突起上側ノ鋸齒八乃至十

くるまえび

(二) 頭胸部正中線ノ溝ハ其両側ノモノヨリ幅狹シ、貯精腔左右ノ辨只中央ニテ相接スルノミ、中央辨ノ上部ニ叉狀ヲナセル突起アリ、腔ノ孔ハ縱ニ開ク、精包附器ハ細ク且ツ軟ナリ、雄交接器外緣ハ薄シ、其內葉ノ先端ハ外葉以上ニ延長セス、條紋ナシ、舶狀突起上側ノ鋸齒十乃至十一

ふとみぞえび

(呂) 舶狀突起下側ノ鋸齒三、突起両側ノ溝ハ頭胸部ノ半ハニテ止マル、脚肢細シ、雄交接器內葉後端ノ突起短クシテ畧々直ナリ、第一對ノ脚ノ基ニハ二棘、第二對ノモノハ一棘アリ、第二對ノ觸鬚ハ手綱染ノ如キ摸様ヲ有ス

(三) 頭胸部正中線ニ溝アリ、第一對觸鬚ノ鞭狀部ハ其柄ノ長サニ超ユルコトナシ、舶狀突起両側ノ溝ハ最後ノ鋸齒ノ少シ後ニテ終ル、貯精腔左右両辨ハ中央ニテ相接ス、雄交接器外緣前端ニ近ク極メテ微細ナル鋸齒アリ、舶狀突起上側ノ鋸齒七

くまえび

(四) 頭胸部正中線ニ溝ナシ、第一觸鬚ノ鞭狀部ハ其柄ノ長サニ超ユ、舶狀突起両側ノ溝ハ最後鋸齒ノ處ニテ消

ヲ助クルコトニ汲々タリ、然レトモ從來ノ調査ニヨレハ成長甚タ遲緩ニシテ五六年ヲ經サレハ成熟セス、加之雌ハ凡ソ四ケ年毎ニ一回產卵スルノミナルヲ以テ禁漁期、最小尺度ノ制限、人工孵化其他種々ノ方法ヲ以テ此えびノ蕃殖ヲ計レトモ其効甚タ微ナリ。

此えび普通長サ一尺以上重量二三百目アリテ甚タ大ナルモノナリ、此ヲ捕獲スルニハ大ナル筌ヲ海底ニ沈ム。

生鮮ナルモノハ上等ノ料理ニ用キラル。

いせえび　本邦ニ於テハ房州ヨリ紀州ニ至ルノ沿岸、四國及九州ニ產ス、岩礁ノ間ニ棲ム、地中海沿岸ヨリ佛國ノ北西岸及ヒ英國南部ニモ類似ノ種類產ス、地中海沿岸ニテハ前ニ述ヘタルろぶすたーノ代用品トシテ珍重セラル、ト云フ、又米國ニテハかりふおーにや州ノ一部ニ產ス、何レノ國ノ產モ皆一尺內外ニ達シ刺網、厚網、筌、猪等ニテ捕獲セラル、味美ナルヲ以テ珍味ヲ喜フ者ニ歡迎セラルレトモ其棲息ニ適スル地少ナク從ツテ產額小ナルヲ以テ經濟上重要ノモノト認ムルコト能ハス。

ざこえび　方言種々アリ、又種類多シ、然レトモ其主ナルモノハ學術上くらんごん(Craugon)及ヒぱれーもん(Palaemon)屬ニ屬ス、形概ネ小ニシテ淺所ニ產ス、此類モ別ニ重要ナルモノニハアラス、然レトモ我々ノ注目スヘキモノハ米國かりふおーにや州沿岸ニ於テ支那人ノ營ム所ノ漁業ナリ、年々同州ヨリ此類ノえび乾シタルモノヲ支那本國ニ送ルコト數萬圓ナリト云フ、其用ユル所ノ漁具ハ九州ニテ使用スルあんこう網類似ノモノナリ。

第二對ノ噛肢及ヒ第一、第二對ノ脚ノ第二節ニ棘アリ第一對ノ脚ニハ第三節ニモ棘アリ、又第二對ノ脚ノ間ニハ一對ノ長キ棘アリテ前方ニ向フ、雌ニ於テハ第四對ノ脚ノ第一節ハ体正中線ニ向フテ延長ス、貯精腔ハ淺ク、其中央辨ハ先端中央ニ楕円形ノ突起アリ、左右両辨ハ中央ニテ癒合ス、腹環節上面ハ第二環節ヨリ隆起アリ、尾環節ハ長ク且ツ第六腹肢ト其長サヲ同フス雄ノ交接器ハ左右不同ニシテ左方長ク且ツ後端ニ於テ右ニ曲レリ（第七版第十二圖）。

尾環節中央ニハ判然セル溝ナシ、只僅ニ窪ミタルノミ、其各側ニハ三個ノ可動的棘ト一個ノ不動的棘トアリ。

大サ雌ハ三寸四分雄ハ三寸。

大体ヨリ云フトキハ本種ハくるまえび属中最モ古キ形態ヲ具フルモノナリ、然レトモ外部生殖器ハ古キ形態ノモノト稱スルヲ得ス。

本種ニ類似ノモノ尚ホ二三種アルヲ認ム、然レトモ調査シタル數少ナキヲ以テ爰ニ省ク。

### くるまえび属以外ノえび

ろぶすたー　えび類中最モ珍重セラル、モノハ歐米北部ニ産スルモノニシテ英語ニテろぶすたー、獨乙語ニテふんまート稱セラル、モノナリ、のるうぇーニテハ千八百九十六年五十四萬餘尾價額凡ソ四百餘萬圓、にゅーふぁうんどらんどニテハ千八百九十四年ニ六百二十三萬餘尾、米國ニテハ一ヶ年千五百萬餘ぽんど價額百餘萬圓ノ收獲アリ。

のるうぇーニテハ近隣ニ數多ノ大市場ヲ有スルヲ以テ概ネ生賣ス、かなだニテハ五分二厘ハ生賣シ、四分八厘ハ罐詰ニ製ス、即チ同國ニテハ年々百二三十萬個ノ一ぽんど入罐ヲ造ル、又にゅーふぁうんどらんどニテハ年々百四五十萬個ノ一ぽんど入罐ヲ造ル。

此種ノえびハ需要甚タ廣シト雖、何レノ國ニ於テモ年々減少ス、故ニ此漁業ノ盛ナル所ニテハ孰レモ人工ヲ以テ其孵化

第一對ノ脚ニハ第二及第三節ニ棘アリ、第二對ノ脚ニハ第二節ニ棘アリ、又第二對ノ脚ノ間ニ太ク長ク且前方ニ向フ二本ノ棘アリ。

腹部ニハ第二環節ヨリ隆起アリ、第三環節ニ於テ殊ニ著シ。

雄ノ第一對ノ腹肢ニアル交接器ハ左右相稱ニアラス、左ノ半分ハ右ノ半分ヨリ長シ（第七版第十一圖）。

尾環節ハ第六對ノ腹肢ト畧ホ其長サヲ同フス、其中央ニハ淺キ溝アリ、又其両側ニハ三對ノ可動的棘ト一對ノ不動的棘トアリ。

本局ノ標本ハ雄ニシテ長サ二寸ノモノナリ。

色彩ハ附肢ニ於テ鮮紅色ヲ帶ヒ甚タ美麗ナリ。

分布―從來知ラレタル所ニヨレハ只本邦ノミニ產ス、越中國魚津、北見國宗谷及ヒ瀨戸內海ニ產ス、又第二回水產博覽會ノ際豊後國北海部郡漁業組合ヨリ出品シタルはらぶとえびナル一ノ雌ノ標本ハ多分本種ナリト信ス。

瀨戸內海ニ產スルモノハ變種ト見テ可ナリ。

何レノ地ニ於テモ產額少タ重要ノモノト認ムルヲ得ス。

## あかえび（第六版第三圖）

殼ハ全体細毛ヲ以テ蔽ハル、舳狀突起ハ畧々眞直ナリ、或ハ前端ニ於テ少シク擧レルコトアリ、第一觸鬚ノ柄ヨリモ短シ。

突起上側ノ鋸齒ハ七或ハ八ニシテ突起ノ先端ニ達ス、甲ニハ最後ノ鋸齒ニ續ク隆起ナシ、甲ノ前下隅ハ尖リテ齒ヲナス。

輸精管ハ細クシテ數回彎曲ス、射精管ハ末端ニ近クニ從ヒ太ク、最終ノ處嚢狀ヲナス。

精蟲ハ三角形寧ロ獨樂形ヲナス、數十ノ精蟲楕圓嚢中ニ包藏セラル。

雄ノ第一對ノ腹肢ニアル交接器ハ丁字狀ヲナス（第七版第十圖）、又雄ノ第二對ノ腹肢ノ內枝ハ變形セリ。

尾環節ニハ五條ノ淺キ溝アリ、其両側ニハ肉眼ニテ認メ難キ小棘三對アリ。

色彩ハ成長シタルよしえびノモノニ酷似ス。

泥質ノ淺海ニ住ミ甲殻類、貝類、硅藻等ヲ食ス。

雄ハ周年成熟セル精蟲ヲ有ス。

産卵期ハ六月中旬ヨリ八月ニ至ル、雌ハ二寸五分以上ニアラサレハ産卵セス、雄ハ一寸八分ニシテ成熟シタルモノアリタリ。

雌ハ四寸二分マテ成長ス、雄ハ三寸五分、就レモ一ヶ年以上ノ壽命ヲ有ス。

本種ハ本邦及ヒあらふら海ニ産ス。

本邦ニ於ケル分布ハ東京灣、清水港、伊勢海、大阪灣、瀨戸內海、鹿兒島灣、青森灣ナリ。

腐敗シ易シ釣餌トシテ用ヰラル、末タ乾蝦ニ製ラレタルヲ知ラス。

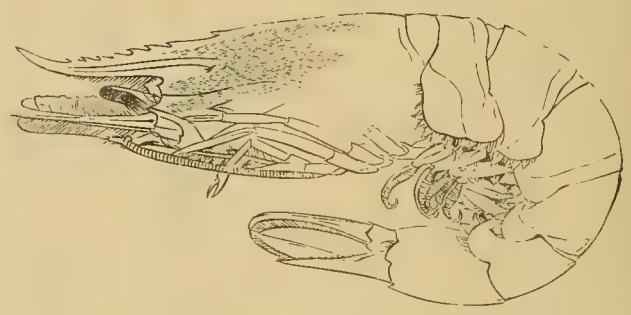
## ほつこくえび（第六版第一圖）

さるえび　備後　　たゆえび　備後　　はらぶとえび　豊後

本種ノ概形ハ太クシテ短シ殻ハ全面細毛ヲ以テ蔽ハル、觚狀突起ハ幅廣ク短ク、眼ト其長サヲ同フス、突起上側ノ齒ノ數ハ九或ハ十、其最後ノモノハ後ニハ隆起ナシ。

甲ノ前下隅ニ齒アリ、然レドモ其先端銳利ナラズ。

## ちくごえび　雌



第一及第二對ノ脚ノ第二節ニ各々一棘アリ、第五對ノ脚最モ長シ。

雌ノ受精腔ノ中央辨ハ大ニシテ署々長楕圓形ヲナス、左右兩辨ハ中央ニテ癒合ス、腔ハ左右二個ノ別房ニ分タル、雄交接器ハ先端ニ於テ分タレ其形狀獸類ニ於ル頭角ノ如シ（第七版第九圖）。

大サ雌ハ四寸五分雄ハ三寸五分。

産地　筑後三潴郡川口村（乾蝦トシテ第二回水產博覽會ニ出品シタリ）、名稱不詳ナルヲ以テちくごえびノ名ヲ以テ區別セリ。

## さるえび（第六版第四圖）

こさくえび　神奈川　あたまぶと　大坂　さんごえび　駿河　かあつ　相州三崎
しろえび　備中　しらす　德島　さるきんざこ　ふしたかえび　鹿兒島　さるえび

殼ハ全面細毛ヲ以テ蔽ハル、舳狀突起ハ雄ニ於テハ眞直ニシテ短カケレトモ雌ニ於テハ先端上ニ反リ曲リ且ツ第一對觸鬚ノ基節ト長サヲ同フス、此突起ニ續キ微ナル隆起アリテ甲ノ後端ニ達ス、其上側ニ並フ齒ノ數ハ通常八個ナリ。

甲ノ前下緣ハ幾分カ尖リタレトモ棘ヲナサス、第一及第二對ノ脚ノ第二節ニ棘アリ。

貯精腔中央辨ハ署ホ稜形ヲナシテ凹ミタリ、左右兩辨ハ小ク短ク中央ニテ癒着ス、腔口ハ細クシテ知ルニ難シ、又腔ハ左右二個ノ別房ヨリナル其壁ハ軟ナリ（第七版第十圖）。

精蟲ヲ受取リタル雌ハ貯精腔中央辨ノ凹所ニ膠ノ凝結セルカ如キ褐色ノモノヲ見ル、是レしばえびニ見ル葉狀物ニ相同ノモノナラン、然レトモ一定ノ形ナキヲ以テ異ナレリ。

第四腹環節以後ニ隆起アリ、尾環節ニハ中央ニ淺クシテ狹キ溝アリ。

貯精腔ノ中央辨ハ大ニシテ畧々稜形ヲナシ、中央ニ縱溝アリ、側辨ハ中央ニテ相合ス、腔ハ左右二個別々ニアリ（第七版第八圖）。

雄交接器ハ扁平ナル管狀ヲナシ內葉ノ先端ハ側面ニ延長ス（第七版第八圖）。

色ハ淡褐ナリ、微小ナル褐色ノ點環節縫合線ノ邊等ニ集マリ不分明ナル條紋ヲナス、觸鬚腹肢及扇形部ノ端ハ稍々紅色ヲ帶フ。

雌ハ体ノ長サ二寸五分雄ハ体稍ヤ小ナリ。

本邦及支那ニ產ス、本邦ニ於テハ東京、愛知、兵庫、岡山、香川、佐賀、福岡ノ諸府縣ニ產ス、殊ニ愛知、岡山ノ二縣ニ多ク東京府ニハ稀ナリ

釣魚用餌料トシテ用キラル、又乾蝦トシテ輸出セラル。

秋期ニ漁獲セラル。

## ちくごえび

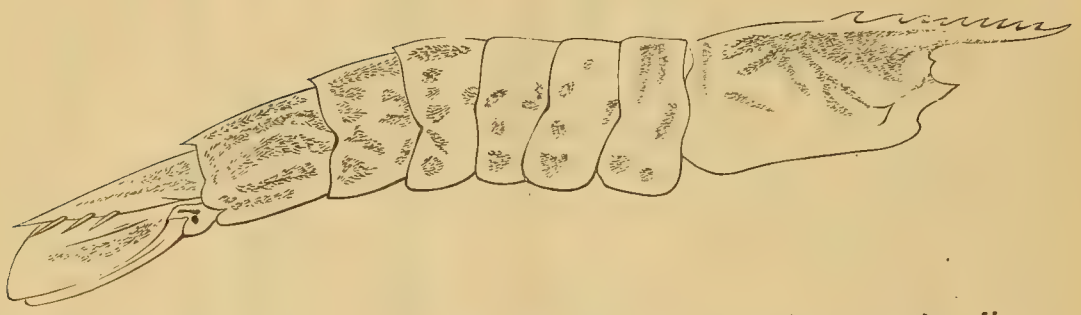
殼ハ平滑ニシテ硬シ、只甲ノ上半面ニノミ細毛生ス、舳狀突起ハ雄ニテハ稍々眞直ナレトモ雌ニ於テハ其先端擧リ且ツ雄ノモノヨリ少シ長シ、雄ノ舳狀突起ハ第二觸鬚ノ葉狀附器ヨリ少シ短シ、突起上ノ齒ハ八個アリ、甲ノ上面正中線微ナル隆起アリ。

前種ニ於テ見ルカ如ク甲ノ前緣鬚上齒ノ少シ上ノ處ヨリ甲ノ正中線ニ並行セル裂ケ目ノ如キ線アリ、甲ノ中途ニテ消失ス。

第四腹環節以後ニ隆起アリ尾環節ノ中央ニ溝アリ。

貯精腔ノ側辨ハ低クシテ中央ニテ相癒着ス、第四對ノ脚ノ第一節延大シテ中央辨ノ左右ヲ蔽フ、腔ハ隔壁ニヨリ二房ニ分タル。

## とさえび



体ノ長サ三寸。

本種ハ高知縣ヨリ第二回水產博覽會ヘ出品シタル生物標本中ニアリテ只雌ノ標本二箇アリタルノミナリ、從來知ラレタル種類ト異ナルヲ以テ新種ト認ム。

本種ニ近キモノハよしえび、もえびナレトモ尾環節両側ニ棘アル點ニ於テ全ク異ナレリ、又みるんえびわーびノ *P. styliferus* ノ記載ニ符合スル點多ケレトモ舳狀突起ノ短クシテ直ナル點及其歯ノ數位置等ニ於テ異ナレリ、又尾環節ニ三對ノ棘ヲ有スルハあかえび等ニ似タレトモ一對ノ不動的棘ヲ欠クコト甲ノ前下隅ニ歯ノナキコト及ヒ貯精腔ニ中央ノ隔壁アル等ノ點ニ於テ同シカラス。

方言詳ナラサレハ假ニとさえびト名ク、効用モ詳ナラス。

## さくらえび（第六版第二圖）

かせえび　香川・あかさわえび　福岡　さくらえび　愛知

殻ハ平滑ニシテ毛ナシ、舳狀突起ハ甲ノ長サノ二分一ニ當リ、第一觸鬚ノ柄ヨリ短カシ、突起上ノ歯ハ八個ニシテ胃歯ヲ欠ク、甲ノ背面正中線ニ隆起ナシ、鬚上歯ノ上邊ヨリ甲ノ正中線ニ並ヒテル走割レ目ノ如キ線アリ甲ノ後端ニ達セスシテ消失ス。

第一及ヒ第二對ノ脚ノ第二節ニ各々一棘アリ、脚ハ皆ナ細シ。

腹肢ノ柄ニハ其横幅ノ凡ソ三分一ニ當ル溝アリテ其中ニ細毛生ス、雄ニ於テハ第六對ノ腹肢ノ柄ニ隆起ヲ見ル。

尾環節ニハ中央ニ淺キ溝アリ、且ツ其両側ニ各々二條ノ淺溝アリ。

色ハ淡黄ニシテ微少ナル綠色ノ斑點アリ、扇形部ノ外緣ハ綠色ヲ帶フ。

通常四寸二三分ノ大サニ達ス、然レトモ成長ノ最モ良キモノハ雄ニ於テハ四寸六分雌ニ於テハ五寸ニ及フ、雄ハ三寸雌ハ三寸五分ニ達スレハ熟ス、六月ノ初ニ交尾シ、七八両月間ニ産卵ス。

本種ハ末タ本邦以外ニ於テ發見セラレス東京灣、伊勢海、瀨戸内海、鹿兒島縣等ニ産ス、多クハ深サ十尋以内ノ沙底ニ産ス、幼稚ノモノハ干潟ノ沙中ニ埋沒シテ棲ム、秋期ニハ大群ヲナシ且ツ多少移轉ス。

本種ハ他種ト異ニシテ多ク硅藻ト稱スル顯微鏡的ノ海藻ヲ食トス

くるまゑび屬中くるまえび及ヒあかえびニ次テ重要ナルモノナリ、釣漁ノ餌料トシテ又食用品トシテハ生鮮ノマヽ、或ハ乾シテ用ヰラレ需用甚タ廣シ。

## さえび

殻ニハ淺クシテ不規則ナル溝數多アリ、其中ニ細毛生ス。

舳狀突起ハ眞直ナリ、其長サハ第一觸鬚ノ柄ノ長サニ均シ、其齒ハ九アリテ突起ノ前端ニ至ルマテ生ス、此ノ突起ニ續キ低キ隆起アリテ甲ノ後端ニ達ス。

第一對ノ脚ニハ二棘、第二及ヒ第三對ノ脚ニハ各々一棘アリ、

第一腹環節ヨリ背部正中線ニ微ナル隆起アリ、第四腹環節以後ニテハ隆起判明ナリ。

尾環節ニハ中央ニ溝アリ、又其左右ニ各々二條ノ淺キ溝アリ、側緣ニ三對ノ長棘アリ。

ノ小棘アリトスル點等ニ於テ異ナレリ。

## しばえび（第五版）

あかひげ　愛知　しろえび　愛知　おほえび　岡山　しばえび　東京

殻ハ薄クシテ柔ク又特殊ノ窪ミタル處アリ、其内ニ細毛密生ス。

觸狀突起ハ前端ニ於テ僅ニ曲レリ、其齒ハ通常七個ナリ、其前端ノ齒ナキ部分ハ觸狀突起ノ長ノ凡ソ二分一ニ當ル、甲ノ背部正中線ニハ觸狀突起ニ續キ極メテ微ナル隆起アルコト又肝齒ト甲ノ後緣トノ間ニ少シク曲リタル微ナル隆起アルコトハよしえびニ異ナラス。

第一乃至第三對ノ脚ノ第二節ニ各々一棘アリ、雄ニ於テハ第三對ノ脚ノ棘甚タシク發達シ、同脚第二節ノ長ヨリ長シ其先端ニ奇妙ナル特別ノ冠アリテ捕鯨銛ノ如キ形ヲナス、又第五對ノ脚ノ第四節ニ外方ニ向ヘル齒アリ尙第四對ノ脚ニモ稍ヤ同樣ノモノヲ見ル。

腹部ニハ背面正中線ニ隆起アリ、然レトモ第一乃至第三環節ノ間ニ於テハ甚タ微ナリ、又第一環節下緣ニ切レ込ミアリ、雄ニ於テ殊ニ著シ。

貯精腔ノ三辨ハ其長サ相同シ、中央辨ノ大部分ハ鉛直ノ板ナレトモ其下端ハ左右ニ開ケリ、側辨ハ穹隆シ其内緣ハ中央辨ノ全長ニ沿フテ接著ス、故ニ其腔孔甚タ廣シ腔内ニ精液ヲ藏スルモノニハ中央辨下端ノ廣キ部分ニ乳白色ヲ帶ヘル木葉狀ノ附屬物附着ス、精液ハ包囊ヲ被ラス、貯精腔内ニアルモノハ幾分カ固マリテ流動体ヲナサス（第七版第七圖）。

輸精管ハ長クシテ屈曲多シ、射精管ハ太ク其末端ハ甚タシク膨脹シ内部ハ三室ニ分タル。

雄ノ交接器ノ内葉前端ハ細長ク且ツ背面ニ向ヒテ曲レリ（第七版第七圖）。

第三節ニモ小齒アリテ第四節ノモノト相對ス。

腹部ニハ第一環節ヨリ最後ノモノニ至ルマテ背面正中線ニ隆起アリ然レトモ第一乃至第三環節ノ間ニハ甚タ微ナリ、第一環節ノ下緣ニ切レ込ミアリ、雄ニ於テ殊ニ著シ。

貯精腔ノ中央辨ハ前方ニ開キ左右兩辨ハ各々外緣ニ於テ半月形ニ隆起セリ、第四對ノ脚ノ第一節特ニ延長シテ中央辨ヲ夾ミ、側辨ノ前部ヲ蔽フ、腔ハ隔壁ニヨリ二房ニ分タル（第七版第六圖）。

雄交接器內葉ノ先端ハ甚タ大ニシテ外葉ノ先端ハ爲メニ殆ント隱レテ見ヘス（第七版第六圖）。

腹肢ノ柄ニハ全面ニ細毛密生ス、雄ニ於テハ第六對ノ腹肢ノ柄ニ隆起ヲ見ル。

尾環節中央ニ淺キ溝アリ又其兩側ニ各々二條ノ溝アリ。

成長セルモノハ淡褐色ヲ帶ヒ、未成長ノモノハ灰緣色ヲ帶フ。

畧々六寸ノ大サニ達ス、四寸以上ノモノハ成熟セル種類ト認メラル、夏期產卵スルモノ、如シ。

本種ハもゐび及ヒしばえびニ類似ス、特ニ幼稚ノモノニシテ四寸以下ノモノハ殼ノ大部分平滑ニシテもえびト區別シ難キモノアリ、且ツ幼時ハもえびト同處ニ捿息シ色モ亦タ同シ、然レトモ成長セルモノハ色ヲ異ニシ且ツ捿息處ハもえびノモノヨリ深シ。

三寸四分位ノモノニハ体ニ毛少ク甚タシクもえびニ似タリ四寸以上ニナレハ毛ハ十分生スルカ如シ。

太平洋ニ產ス本邦ニ於テハ東京灣、伊勢海、瀨戶內海、中海、宮津灣、富山灣、琉球等ニ分布セリ。

島根縣中海ヨリ鹽藏品、乾製品トシテ多ク產出セラルヽハ此えびナリ。

本種ハ英國探險船ちゃれんじゃー號ノぱぷあ及ヒふゐりぴん近海ニテ得テ Penaeus incisipes ト命名サレタルモノニ同シ、ぞはーんノ日本動物篇ニむなそり P.monoceros (P.ensis) トセルモノハ或ハ本種ナランカ然レトモ尾節兩側ニ各々二對

雄ニ見ル第一腹環節下緣ノ切リ込ミハ左程著シカラス。

腹肢ノ柄ニハ其幅ノ凡ソ五分ノ一ニ當ル細キ溝アリテ其中ニ細毛生ス、又雄ニハ第六對ノ腹肢ノ柄ニ突起アリ。

尾環節中央ニハ淺キ溝アリ、其両側ニ各々二條ノ溝アリ。

淡黃色或ハ淡緣色ヲ帶フ、扇形部ノ邊緣ハ緣色ナリ。

雌ハ四寸、雄ハ三寸二分ノ大サニ達ス。

雌ハ七月中旬ヨリ精蟲ヲ受取ル、產卵期ハ八月乃至十月ナリ。

生レタル翌年ニ成熟ス成長ノ度ハ詳ナラサレトモ凡ソ一ケ年ニテ死亡スルモノヽ如シ。

二寸程ノモノハ殼ニ毛ナシ、成長スルニ從ヒ毛ヲ生ス。

本種ハ灣奥ノ淺處ニノミ產ス、通常十尋以下ノ處ニ棲息ス、くるまえび類中最モ淺キ處ニノミ產スルモノヽ一ナリ。

世界上ノ分布ハ本邦及ヒ印度ニシテ本邦內ノ分布ハ東京灣、伊勢海、瀨戶內海、有明海、及ヒ鹿兒島縣下、臺灣等ナリトス。

## よしえび（第四版第二圖）

まえび、しらさえび、ほうぞうえび、うなぎりえび、さるえび、ほんじょうえび　島根　やなぎえび　富山　よしえび　尾張

殼ニハ微ナル隆起不規則ニアリテ其間ニ細毛密生ス、舳狀突起ハ殆ンド眞直ナリ、雌ニ於テハ先端少クシ上ニ曲レリ、其齒ハ上側ニノミアリテ通常八、甲ノ正中線ニハ舳狀突起ニ續ク極メテ微ナル隆起アリ、又肝齒ト甲ノ後端トノ間ニ少シ曲リタル微ナル隆起アリ。

第一對ノ脚ニハ二棘、第二及ヒ第三對ノ脚ニハ各一棘アリ、雄ニ於テハ第五對ノ脚ノ第四節ニ內ニ向ヒタル齒アリ、其

微細ナル鋸齒ヲ有ス、然レトモ此部分ハ隱レテ見ヘス、雄交接器內葉後端ノ突起ハ短カク且ツ直ナリ（第七版第四圖）。

色ハ茶褐色或ハ黑褐色、濃淡相次キ畧ホ條紋ヲナス、扇形部ノ色彩ハ鮮明ナラス。

大サハ本實驗場ニ於テ撿シタルモノ、中ニテ最大ナルモノハ雄ニ於テ七寸八分。

本邦印度及南洋ニ產ス、本邦ニテハ稀ナル種類ナリ、只東京灣、伊勢內海、臺灣等ニ產ス。

本種ハくまえびニ酷似ス、故ニ此兩種ヲ區別スルコト難ク、從來兩種ヲ混同シテ記載セルモノ往々アリ。

## もえび（第四版第一圖）

しんちゆう　神奈川　きのかはえび　岡山　もえび　東京

殼ハ硬クシテ其大部分ハ平滑ナリ、只甲及ヒ第五腹環節以後ニ不規則ナル淺キ溝アリテ此ニ細毛生ス。

舳狀突起ハ殆ント眞直ナリ、雌ニ於テハ先端ニ於テ少シク擧レリ、其齒ハ上側ニノミアリテ其數八或ハ九、突起ノ先端ニマテアリ、突起ノ長サハ雌ニ於テハ畧ホ第二對ノ觸鬚ノ附器ニ均シト雖雄ニ於テハ稍ヤ短シ。

舳狀突起ニ續ク隆起及ヒ肝齒ト甲ノ後端トノ間ノ隆起ハ稍ヤ分明ナリ。

第一乃至第三對ノ脚ノ第二節ニ各々一棘アリ、雄ニアリテハ第五對ノ脚ノ第四節ニ一個ノ齒アリ。

貯精腔外部中央辨ハ小ク且ツ低ク其中央前部ニ小突起ヲ有ス、左右兩辨亦小クシテ扁平ナリ、腔孔分明ナラス、加之第四對ノ脚ノ第一節延長シテ左右ヨリ中央辨ヲ夾ミ、側辨ノ前部ヲ蔽フ、又腔內部ハ中央ノ隔壁ニヨリ左右ノ二房ニ分タル（第七版第五圖）。

雄ノ交接器ハ畧々筒形ヲナス其內葉前端ハ四分一圓ノ如キ形ヲナシ、外葉前端ハ左右ニ開ク、又內葉後端ハ內方ニ曲リテ左右ノモノ相接ス（第七版第五圖）。

ハ稍ヤ紫色ヲ帶フ。

雌ノ最大ナルモノハ七寸三分、雄ノ最大ナルモノハ六寸一分ニ及フ。

産卵期ハ七、八兩月間ナリ、雌ハ産卵後十月頃マテハ精包ヲ貯フレトモ其以後ヨリ翌年六月中旬マテハ精包ヲ貯フルモノナシ。

本邦ニ於ケル本種ノ分布及ヒ産額ハくるまえびニ及ハス幾内、東海道、四國、九洲、山陽道、山蔭道ニ産ス。

本邦以外ニモ産スヘシト思ハル、恐ラクハ他種ト混同セラルヽナラン。

本種ハ乾蝦トスルニ殻皮硬クシテ良質ナラストス云フ。

## うしえび（第二版第一圖）

くろくま　東京　うしえび　尾張

殻ハ平滑ニシテ硬シ、舳狀突起ハ少シク彎曲シ且ツ先端ニ於テ擧レリ、其齒ハ上側ニ七或ハ八、下側ニ三ナリ、同突起ニ續キテ走ル隆起ハ低ク且ツ溝ナシ、其左右ニアル溝ハ淺クシテ同突起最後ノ齒ノ前ニテ消失ス。

第一觸鬚ノ鞭狀部ハ長クシテ其柄ノ長サニ超ユ。

脚ハ細クシテ第三對ノモノ最モ長シ、第一對ノ脚ニハ第二及ヒ第三節ニ各々一棘アリ、第二對ノ脚ニハ第二節ニ一棘アリ。

尾環節中央ニハ顯著ナル溝アリ、其両側ニハ棘ナシ。

交接器ハ大体ニ於テくるまえびノモノト異ナラス然レトモ仔細ニ撿スレハ種々相異ナル點ヲ見ル、即チ貯精腔左右両辨ハ中央ニテ相接シ且ツ前方ニ於中央辨ト接シ其接合線Y字狀ヲナス、雄交接器外緣先端ハ曲リテ尖リ、且ツ若干ノ極メテ

付鹿兒島縣下產甲殻類ノ中ニ本種ノ標本一個交ハルヲ見ル最初ハくるまえびノ斑紋ナキモノト思ヒタルモ後チ委シク調フルニ至リ全ク別種ナルコトヲ明ニセリ。

日本橋魚市場ヨリハもえびト稱シテ持チ來リ又理科大學動物學教室波江元吉氏ハ相州三崎ニ於テ本種ヲ見、方言しんちゆうト呼フヲ聞ケリト云フ、然レトモもえび又ハしんちゆうト稱スルモノハ別ニ之アルヲ以テ便宜ノ爲メふとみえびト命名シ他ノ種類ト區別スルコトヽセリ。

## くまえび（第三版）

あかしあし　尾張　あしあか、くろえび　周防　くろし　相模三崎　ちょろうえび、くるまえび　豊後

殻ハ平滑ニシテ毛ナク硬固ナリ、舳狀突起ハ微ニ彎曲ス、其齒ハ通常上側ニ七、下側ニ三ナリ、舳狀突起ニ續キ正中線ニ窪ミアル隆起アリ、其左右ニ沿フテ走ル溝ハ甲ノ中央ニテ終ル。

脚ハくるまえびニ比スレハ細ク、第三對ノモノ最モ長シ、第一對ノ脚ニハ第二及ヒ第三節ニ各々一棘アリ、第三對ノ脚ニハ第二節ニ一棘アリ。

尾環節中央ニハ顯著ナル溝アリ、然レトモ其両側ニハ棘ヲ見ズ。

貯精腔ノ左右両辨ハ中央ニテ相接シ之カ爲メ中央辨ハ過半隱レテ見ヘス、雄交接器ハ其外綠前端ニ近ク極メテ微細ナル鋸齒ヲ具フ、其内葉後端ノ突起ハ短クシテ畧ホ直ナリ。

精包附器ハ柔軟ニシテ帶狀ヲナス此附屬物ハ貯精腔以外ニ顯ハル、コト稀ナリ、多分磨リ切ル、モノト思ハル。

色ハ灰褐色ナリ、濃淡相次キ畧ホ條紋ヲナス、然レトモくるまえびニ於ケルカ如ク判明ナラス、附肢ハ深紅色ナリ、之ニ因テあかあしノ名アリ、又第二對ノ觸鬚ハ紅色ニシテ手綱染ノ如ク濃淡相次ク、扇形部ノ色ハ鮮明ナラス腹肢ノ先端

びニ特有ナル條紋ナキヲ以テ區別スルコト稍ヤ容易ナリ。

殻ハ平滑ニシテ毛ナク、硬固ナリ、舳狀突起ハ微ニ彎曲シ先端ニ於テ少シ擧レリ、其長サハ凡ソ甲ノ五分ノ二ニ當リ、第一觸鬚ノ柄ノ長サニ超エス、其齒ハ上側ニ十乃至十一ニシテ下側ニハ一ナリ。

第一對ノ觸鬚ノ鞭狀部ハ甚タ短シ。

甲ノ上面正中線ニアル三條ノ溝ハ殆ント甲ノ後緣ニ達スルコトくるまえびニ於ケルカ如シト雖、両側ノ溝ハ中央ノモノヨリ幅廣シ然レトモ幼稚ノモノニ於テハ三條ノ溝ノ幅ハ殆ント相同シ。

脚ハ太ク且ツ第三對ノモノ最モ長シ、第一及第二對ノ脚ノ第二節ニ各々一棘アルコト及ヒ尾環節中央ニ溝アルコト、其両側ニ各々三個ノ小棘アルコトハくるまえびニ同シ。

受精腔ハ左右ノ両辨前後ニ長クシテ体ノ正中線ノ處ニテ相接シ、中央ノ辨ハ少シク左右ノモノヽ爲ニ蔽ハル、中央辨ノ前端ニ叉形ノ角アリ(第七版第二圖)。

精包附器ハ柔軟ニシテ帶狀ヲナス、雄交接器ノ外緣ハ薄シ其内葉ノ先端ハ外葉以外ニ延長セス後端ノ突起ハ長クシテ外方ニ向ヘリ(第七版第二圖)。

色ハ淡褐色或ハ灰色幼時ナリ、扇形部ハ美麗ニシテ邊緣ニハ紫色、藍青色相次キ其外ニ朱色ノ細毛生ス背面隆起(甲ノ正中線第四腹環節以後ノ諸環節正中線)ハ黑ク各腹環節下緣ニ近ク紫色ノ小斑アリ。

六寸以上ニ成長ス、生物學的最小形ハくるまえびノモノヨリ小ナリ、然シ調査材料ノ少キ爲メ其尺度ヲ確定スルコト能ハス、産卵期ハ夏期ニアルカ如シ。

本種ハ未タ記載セラレタルコトナシ、本種ノ標本ヲ始メテ見タルハ明治二十九年九月ニシテ相模下浦産おほもえびトシテ雌二尾ヲ日本橋魚市場ヨリ持來レリ、爾來時々此種ヲ見ル皆ナ東京灣ノ産ナリ然レトモ寧ロ稀ナル種類ナリ、本所備

場ヨリ毎週一回乃至二回大小種々ノ標本ヲ取寄テ調査シ概略ノ判斷ヲ下スニ止マル。

同年ニ生レタルモノニテモ成長ノ度ニ甚タシキ差異アレトモ凡ソ滿一年ニシテ三寸乃至四寸ノ長サニ達シ滿二年ニシテ五寸以上ノ長サ即チ成熟シタルモノヽ大サニ達スルモノヽ如シ、即チ雄ハ滿一年ノ後成熟シ雌ハ滿二年ノ後ニ成熟スルモノヽ如シ。

本種ノ世界上分布ハ本邦、支那、印度、南洋諸島、及ヒ印度洋西海岸トス本種ニ酷似セルモノ地中海ニ產ス。

本邦ニ於ケル分布ハ畿內、東海道、四國、九洲、山陽道、山陰道、北陸道等トス。

內灣ノ河口附近ヨリ外海ニマテ產ス深サ凡ソ三十尋マテノ處ニ捿息ス、幼時ハ淺所ニ捿息スレトモ成長スルニ從ヒ深處ニ移ル、群捿ス。

雌ノ最大ナルモノハ長サ九寸ニ及ヒ雄ノ最大ナルモノハ八寸ニ及フ。

分布廣ク、產額多ク、形狀大ニ味ハ他ノ種類ニ勝リ且ツ比較的強壯ニシテ蓄養運搬共ニ便ナレハ此屬中ニテ最モ珍重セラル、水ヲ離レテモ長ク生活スルヲ以テ鮮魚ノ供給甚タ少キ夏時ニ於テ特ニ貴ハル。

受精腔左右ノ瓣ハ中央ニテ癒着シ、腔ノ孔口ハ上部ニ於テ橫ニ開ク、精包ハ羽狀ヲナセル特別ノ附器ヲ有ス、此附器射精管末端ニ於テ完成ス。

雄交接器ノ外緣ハ太ク、其內葉ノ先端ハ長クシテ肉質ノ突起ヲ作リ、後端ハ長ク突出シテ外方ニ向ヘリ。

## ふとみぞえび（第二版二圖）

もえび　東京　しんちゆう　三崎

本種ハくるまえびニ酷似ス、故ニ委シク撿查スルニアラサレハ此ト區別スルコト難シ、但シ生鮮ノモノニテハくるまえ

殻ハ平滑ニシテ毛ナク硬固ナリ、舳狀突起ハ僅ニ彎曲ス其長サハ甲ノ二分ノ一以上ニ居リ、第一觸鬚ノ柄ノ長サニ超ユ、其齒ハ上側ニ八、九或ハ十ニシテ下側ニハ一ナリ。

第一對ノ觸鬚ノ鞭狀部ハ甚タ短シ。

舳狀突起ニ續キ甲ノ正中線ニ隆起アリ此ニ最後ノ鋸齒ノ後ヨリ溝アリ、又此隆起ノ左右ニ溝アリ、此等三個ノ溝ハ殆ント甲ノ後端ニ達シ、其幅殆ント相同シ。

脚ハ他ノ種類ニ比スレハ太シ第三對ノ脚最モ長シ第一及ヒ第二對ノ脚ノ第二節ニ各々一棘アリ。

尾環節ニハ中央ニ顯著ナル溝アリ、又同環節ニハ三對ノ可動的棘アリ。

色ハ年齡ニヨリ多少異ナレリ、概ネ淡褐色或ハ灰色ニシテ環節接合線ニ異ホ並行シテ走ル十餘條ノ濃色ノ條紋アリ。

扇形部ノ色ハ甚タ美ナリ、邊緣ニ近ク黃色、藍靑色ノ部相次キ其外部ニ朱色ノ細毛密生シテ鮮明ナリ。

貯精腔ハ左右ノ兩辨中央ニテ相着合シテ囊狀ヲナシ中央辨ハ隱レテ見ヘス、成長シタルモノハ概ネ四時此腔中ニ精包ヲ藏ス、精包ニハ羽狀ヲナセル附屬物アリテ腔外ニ出ツ(第七版一圖)。

雌ハ五寸以上ニ達セサレハ產卵セス、常ニ交接スルモノナレトモ產卵期ハ七八兩月間ナリ。

雄ハ四寸以上ニ達スレハ成熟ス、成長シタル雄ハ常ニ熟シタル精蟲ヲ貯フ、精蟲ハ輸精管ノ周圍ヨリノ分泌物ニ包マレテ精包ヲナス、此精包ノ出來方ハ甚タ迅速ナルモノト見ヘ夥多ノ標本ヲ調査セシカ成長セル雄ニシテ之ヲ有セサルモノニハ未タ一回モ遭遇セシコトナシ。

精包中ニアル精蟲ハ皆十分成熟セルモノニシテおるとまんノ說クカ如キ精包中ノ精蟲ニシテ種々ノ發達ノ順序ヲ見ルコトナシ。

成長ノ度ニ就テハ未タ精確ナル事實ヲ得ス、研究用ノ水族館アレハ此ヲ知ルコト容易ナレトモ其設備ナキヲ以テ只魚市

ぶえびニ極メテ小ニ、とさえびニテハ長ク、あかえび類ニ於テ著ルシク發達セルヲ見ル、又くまえび、うしえび、しばえび類さくらえび、ちくごえびニハ此ヲ見ズ、而シテ棘ハくるまえび屬幼時ニ最モ善ク發達シタルモノニシテ即チ古ク、溝ハ發生ノ後期ニ生スルモノニシテくるまえび屬ニ取リテ新シ。

棘ヲ有スルえびノ尾環節ハ眞直ナルモ此ヲ欠クモノヽ尾環節ハ少シク背部ニ曲レリ。

## くるまえび屬

体ハ左右ニ狹シ、特ニ腹部後半ニ於テ然リ、甲ノ前端正中線ニハ左右ニ扁平ナル突起アリ舳狀突起ト稱セラル、其上側ニハ一列ノ鋸齒ヲ具フ、又往々其下側ニ鋸齒ヲ有スルコトアリ。

第一對ノ觸鬚ノ柄ハ三節ヨリナル、其第一節ハ上面深ク窪ミテ內ニ眼ヲ容ル、前端ハ二本ノ鞭狀体ヲ以テ終ル。

第二對ノ觸鬚ハ長クシテ其基部ニ大ナル葉狀附器ヲ具フ其長サハ体長ヨリモ大ニシテ種類ニ因テハ二倍ニモ達ス顎ハ強大ニシテ二關節ヨリナル、第二對ノ顎肢ハ七關節ヨリナリ其形狀脚ニ似タリ。

脚ハ凡テ細ク弱ク、太サニ於テハ相互ノ間ニ著ルシキ差ナシ、第一乃至第三對ノ脚ハ其先端螯ヲナス。

腹肢強大ニシテ游泳ノ用ニ供セラル柄ノ先ニハ葉狀ヲナセル二個ノ柔軟ナル枝アリ。

第一對ノ腹肢ノ內側ノ枝ハ雄ニ於テハ大ニ發達シ左右相合シテ交接器ニ變化シ複雜ノ構造ヲナス、雌ニ於テハ其發達甚タ不良ニシテ殆ンド認メ難タキコトアリ、又雄ニ於テハ第二對ノ腹肢ノ內側ノ枝モ稍ヤ變形ヲナス。

### くるまえび（第一版）

まえび　豊後　いせえび　尾張　まんだらえび　尾張　幼雅ノモノチさいまき又ハさやまきト呼フ

種ニシテ尚此外ニ舳狀突起両側ニ沿フテ走ル溝ノ延長セルモノアリ。

甲ノ裂罅　甲ノ前緣ニシテ鬚上齒ノ上ヨリ甲ノ正中線ニ畧ホ並行シテ走ル裂罅ヲ見ルコトアリ、本邦産ノ種類ニテハさくらえび及ヒちくごえびニ此ヲ見ル。

受精腔　此器官ハ分類上甚タ大切ナルモノナリ、雌ノ第四及第五對ノ脚ノ間ニアル部分ノ變形ヨリナル、種類ノ異ナルニ從ヒ大ニ其形狀ヲ異ニスレトモ搆造ノ根本ハ皆同一ナリ、即チ孰レモ中央及左右ノ三部分ニ分ツコトヲ得、而シテ中央部ハ第四胸環節ニ、左右ノ側部ハ第五胸環節ニ屬ス。

雄ノ生殖器ニ於テ種類ノ異ナルニ從ヒ相異アルハ輸精管ノ長短及其屈曲ノ度、精包及其附屬物等ナリ。

雄ノ交接器　第一腹肢ノ變形セルモノニシテ分類上大切ナルコト受精腔ニ同シ、種類ニ因リテ大ニ其形狀ヲ異ニスレトモ根本ノ構造ハ內外二部ヨリナル、內部ハ更ニ先後両端ニ於テ特化セリ、最モ簡單ナルモノハくまえびノモノニシテ最モ複雜ナルハあかえびノモノナリ、概チ背面ニ後方ニ向フテ曲レル突起アリ又概ネ左右相稱ナレトモあかえび類ニニテハ左右不同ナリ。

尚雄ニ於テハ第二腹肢ニ變形ヲ生スルコトアルモ種類ニ因テ甚タシキ變化ナキヲ以テ詳記セス。

甲ノ前下隅ノ齒　あかえび類ニ於テ此ヲ見ル、又此類ノえびノ幼時ニ於テ此ヲ見ル。

脚ノ基部ノ棘　口部ニ近キ脚ニアリ、食物ヲ捕ヘ支フルニ用キラルヽモノナリ。

腹部背面正中線隆起　第四腹環節以後ニハ必スアリ、しばえび類ニテハ第一腹環節ヨリ微ナル隆起アリ、又あかえび及ヒ其近似ノえびニテハ第二腹環節ヨリ隆起アリ、就中第四腹環節ニ於テ著シ。

尾環節中央ノ溝及其両側ノ棘　尾環節中央ニハ概チ溝アリ、其最モ顯著ナルハくるまえび及其近似ノ種類ニシテ微ニシテ殆ント此ヲ見ルコト能ハサルハあかえび及ヒ其近似ノ種類ナリトス、尾環節両側ノ棘ニ至リテハくるまえび、ふとみ

くるまえび屬査定ニ於テ注目スヘキ點ハ大体ニ於テハ色彩及ヒ毛ノ有無、頭腦部ノ形狀長短及ヒ其上下両側ノ齒、甲ノ前下隅ニ齒ノ有無、脚ノ基部ニ棘ノ有無、受精腔ノ形狀、腹部ニ於テハ背面正中線ニ隆起ノ有無、第一第二腹肢ノ形狀、尾環節中央ノ溝及同環節両側ニ棘ノ有無等ナリ。

体ノ色彩　生鮮ノ時ハ種類ニ因テ大差アリ、貯藏セラレタル標品ニテハ此等ノ色彩消失ス、又成長ノ度及ヒ捿息場ノ異ナルニ從ヒ多少ノ變化アリ、体ノ色彩最モ美麗ナルハくるまえびニシテ最モ見榮ナキハしばえびナリ、又体ノ中ニテ最モ美麗ニシテ鮮明ナルハ扇形部ニシテ之ニ次クヲ附肢トナス。

体表面ノ毛　短カキ毛ヲ生スルコトアリ、幼時ニハナシ、甲及ヒ第三腹環節マテハ毛ノ方向前ヘ向ヘトモ第四環節以後ハ後ヘ向ヘリ、毛ノアルモノハ毛ノナキモノヨリ殻皮幾分カ軟カニシテ質脆弱且ツ死シ易シ、又毛ノアルモノヽ殻皮ニハ凹凸多クシテ凹ミタル所ニ毛生ス、毛ノ最モ多キハあかえび及ヒ其近似ノ類ニシテ全ク此ヲ欠クモノハくるまえびソ類ナリ、甲ト最後ノ二三環節トノミニ毛ノ殘レルハもえび、只甲ノミニ殘レルハちくごえびナリ、孰レモ幼時ニハ毛生セス。

舳狀突起　形狀長短ハ同一種類ト雖雌雄ニヨリ多少ノ差アレトモ種類ヲ區別スルニ必要アリ、又上下両側ノ齒ノ數及位置ハ個体ニ因テ相違アリ、下側ノ齒ハ体軀大ナル種類ニノミ見ル、其存在スルトキハ只先端ニノミアリ、而シテ其數ハ上側ノ齒ノ數ヨリ多キコトナシ、又舳狀突起ハ眼ヨリ短カキコト稀ナリ。

甲ノ正中線ニアル隆起及溝　通常舳狀突起ニ續キテ甲ノ正中線ニ隆起アリ、其最モ著ルシクシテ長キハくるまえび、ふとみぞえびナリ、其他ノ種類ニモ皆多少此アレトモあかえびノ類並ニさくらえびニハ舳狀突起最後ノ齒ヨリ後ニハ隆起ナシ。

甲ノ正中線ニ溝アルハくるまえび、ふとみぞえび、くまえびナリ、就中最モ著ルシキハくるまえび、ふとみぞえびノ二

爲ニ窪ミタル所ニ体ヲ容ルレハ体ノ上ニハ砂再ヒ降リテ体ヲ埋ム、然レトモしやこ、あなしやこノ如ク穴ヲ堀リテ其中ニ住ムコトハナシ、一度しばえびノ眼球及ヒ扇形部ニはいぞろぎあト稱スル一種植物ノ如キ下等動物ノ着生セルヲ見タリ。

打瀨綱漁者ハ夜間ニ營業スルトキ多クえびヲ獲ルト云フ、晝間ニ此類ノえびヲ多ク獲ントスルトキハ往々桁網ヲ並用ス、是レ砂泥中ニ在ルえびヲ爬キ起スト同時ニ海水ヲ混濁スルノ利アレハナリ。

打瀨網、手操網、桁網、まんくわ、あんこう網、揚操網、六人網、投網等ヲ以テ之ヲ捕フ、周年漁獲ニ從事ス。

害敵　たい、くろだい、すゞき、こち、はせ、かれい、あなご、さめ、えひ、めくらうなぎ等淺海ノ海底ニ棲息スルモノハ皆多少くるまえび屬ヲ食シテ害ヲ及ホス、又發生時代ノモノハ表面ニ近ク浮游スルモノナルヲ以テ浮游生物ヲ食スルいわし類、あぢ類等ノ爲ニ害セラル、コト夥シ、即チ内海内灣ニ諸種ノ魚類ノ蕃殖スルトキハくるまえび屬ノ蕃殖ニ多少ノ害ヲ及ホシ之ニ反シテ此等魚類ノ減少ハ間接ニくるまえび屬ノ蕃殖ヲ多少助クルモノトナルヘシ。

蕃殖保護　是レマテ說キ來リタルカ如クくるまえび屬ノえびハ生長速ニ蕃殖力モ大ナルヲ以テ別ニ蕃殖保護ノ必要ナシト認ム、モシ又必要アリトスルモ發生ノ樣式前述ノ如キヲ以テ歐米產ノえびノ如ク人工ヲ以テ其孵化ヲ助クルコトハ今日ニ於テ適當ノ方法ナシ、產卵期ヲ保護シテ禁漁期トシ或ハ未成長ノモノ、捕獲ヲ禁止スル地方アルカ如シト雖、其効果甚タ疑ハシ。

濫獲ノ爲ニえび類ヲ害スル魚類ノ減少ヲ來スコトハアレトモ、くるまえびノ類ヲ濫獲スルコトハ困難ナリト信ス。

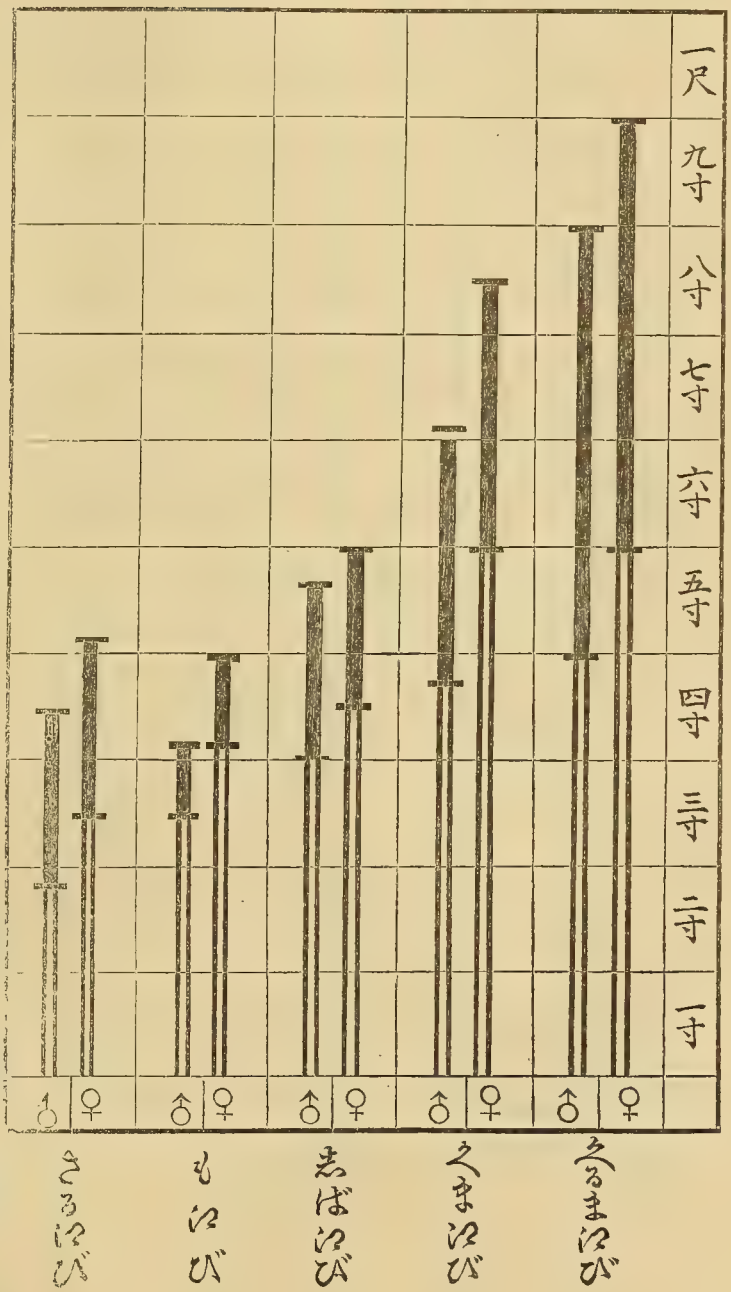
水產調查豫察報告ニ往々此屬ノえびニ關スル記事アリ、概ネ漁夫ノ談話ニ基キタルモノ、如ク精確ナル觀察ヲ欠クヲ以テ參考トスルコト能ハス。

此表ニ依テ見ルトキハ成長ノ度ハ雌ニ於テ速ニシテ雄ニ於テ遅キヲ知ルヘシ、即チ雄ノ形狀小ナルハ弱小ナルノ故ニアラサルヲ知ルヘシ。

第二表

久るまびあ屬

生物學的最小形ト成熟後長大トノ關係




移動　五對ノ脚ヲ以テ歩行ノ用ニ供シ游泳スルニハ腹肢ノ運動ニヨル又往々腹部ヲ急ニ屈曲シ其反動力ニヨリテ後退ス、此ノ如キ際ニ前方ニ屈曲スル部分即チ第四腹環節以後ニハ背面ニ隆起アリテ船舶ノ龍骨同樣ナル働ヲナス。

平生　晝間ハ多ク体ヲ海底ニ埋メテ捿ミ夜間出テ、食物ヲ求ム、幼稚ノくるまえび及ヒしばえびハ大潮ノ際干潟トナレル處ニ於テ体ヲ沙中ニ埋メ只眼ノミヲ出スヲ見ル、此ノ如ク体ヲ埋ムルニハ水ノアル際腹肢ノ運動ニヨリテ砂ヲアオリ

テ屈折シ得ルニ至ル。

まいしす　此時代ノ特徴ハ第一及ヒ第二對ノ附肢ハ游泳ノ用ヲナスコトヲ止メ、其働ハ五對ノ歩脚ノ發達シタルモノニテナサルヽニアリ、此時代ニ至レハ稍々親えびノ形狀ヲ呈ス。

ぷろーん　此時代ハ大体ニ於テハ親えびに異ナラス、只形ノ小ナルノミナリ、長サ二分内外ナリ、まいしす時代ト異ナルハ五對ノ歩脚ハ游泳ノ用ヲナサス、只匍匐ノ用ヲナスノミ、此時代ニハ第一乃至第五對ノ腹肢大ニ發達シテ游泳ノ用ヲナス、第八版第八圖ハ此時代ノえびノ頭部ヲ示ス、大ナル被服ノ基部ノ下ニ尚ホ單眼ノ存在スルヲ認ム。

上述ノ如くるまえび屬發生中最モ著シキ事實ハ發達スルニ從ヒ游泳作用ノ最前附肢ヨリ漸々後方ノモノニ移ルコトナリ。

他ノ甲殻類ノモノト同シク成長スルニ從ヒ時々皮ヲ脱ス、然レトモ變形時代後ニ於テハ完全ニ舊皮ヲ脱スルコトナク、只舊皮ハ甚タ脆弱トナリ處々剝脱スルモノナリ、變形時代ニハ成長速カナルモノハ一二日間ニ一回脱皮ス、其後ニ至リテ何程ノ時日ヲ隔テヽ脱皮スルモノナルカ又脱皮スル毎ニ何程長大スルモノナルヤ明カナラス。

生物學的最小形ト成熟後ノ長大　生殖腺ノ成熟スル大サニ達シタルモノモ尚体ノ長大スルコト止マス、多數ノ材料ニヨリ知リ得タル結果ニヨレハ雄ハ雌ヨリモ小クシテ成熟シ又其長大ノ極點ニ達シタルモノモ雌ノ同樣ノモノヨリハ小ナリ、而シテ生物學的最小形ト長大ノ極點トノ差即チ成熟後長大スル大サハ同種類ニ於テハ雌雄共始ント相仝シ又其差ハくるまえびニ於テ最大ニシテもえびニ於テ最小ナリ、又差ノ大ナルモノハ壽命長シ、此等ノ關係ハ第二表ニヨリテ明カナリ。

さるえびノ如キハ生物學的最小形ハもえびヨリモ小ナレトモ成熟後長大ノ點ニ於テハもえびニ及ハス。

しばえびハ雌雄間ノ大サノ差最小ナリ。

起ノ後方且ツ下面ニ方リ複眼ノ基礎生ズ、即チ腦ノ両側ニ生ズル畧ホ半圓形ヲナセル細胞ノ密集是レナリ（第八版第五圖）、

尾端ハ尚ホ叉形ヲナス、此ニ生スル硬毛ハ七對アリ、中央ニアリテ最モ長キ硬毛ハ体長二分一若クハ其以上ニ達スルコトアリ。

甲ハ長サニ於テヨリモ幅ニ於テ成長宜シ、其後緣ハ第七對ノ附肢アル環節マデヲ被フ、左右両緣ハ下ニ曲レリ、然レドモのーぷりあす時代ヨリハ甲稍々扁平ナリ。

第二對ノ附肢ノ內外枝ハ退化シ只小突起ヲ殘スノミ、之ニ反シ其基部ハ強大トナリ、体ノ正中線ニ向フテ臼狀ニシテ周圍ニ鋸齒ヲ有スル咀嚼面ヲ作ル。

第八對ノ附肢生ス、甚ダ短小ニシテ只先端僅ニ二分スルノミ、此附肢ノ屬スル環節ト最後ノ環節トノ間ニハ七環節アリ、以後新環節ノ生スルハ最終ヨリ第二ニ當ル環節ノ延長シ其分裂ニヨルモノナリ。

神經系ハ附肢アル環節マテハ認ムルコトヲ得、第一對ノ附肢ノ神經球ハ食道ヨリ前ニアリ、第二對ノ附肢ノ神經球ハ食道ノ左右ニアリ（第八版第五圖）。

下唇ハ顎ノ後ニ一對ノ隆起トシテ生ス、然レトモ附肢トシテ見ルコトヲ得ス、此ニ特別ナル神經球ノ存セサレハナリ（第八版第五圖）。

後ニ至レハ甲ノ前端正中線ニ突起ヲ見ル、此突起ハ稍々下方ニ向フ、尾道ニテ採集シタルくるまえび屬一種ノ幼蟲ニハ此突起ノ両側ニ二對ノ小突起ヲ有スルヲ見タリ（第八版第六圖）。

ぞえあ時代ノ終（第八版第七圖）ニ於テハ腹眼大ニ發達シテ柄ノ上ニアリ、五對ノ步脚短ク且ツ前方ニ曲リテ生ス、且ツ第六腹環節ノ附肢生ス、第一乃至第五腹環節ノ附肢ハ只表皮ノ少シク隆起シタルマデニ止マル此時ニハ体ヲ腹部ノ處ニ

褶襞ヨリ此上ノ部分ノ背面ハ後ニ甲ト稱セラレ、体ノ前半ヲ蔽フモノヽ基礎ナリ、當時ハ只頭部ノ一部ヲ蔽フニ過キス。

第一對ノ附肢ハ其先端ノ硬毛ヲ除キ其長サ体長ノ凡ソ四分ノ三ヲ占ム、体長ニ比較シテ此附肢ノ長大ナルハ此時ヲ最トス、附肢ハ其先端ニアル硬毛ヲ入レテ算スルトキハ皆体長ヨリモ長シ、又皆游泳ヲ助クルモノナレドモ最モ有力ナルハ第二對附肢トス、此附肢ハ最モ長ク、太ク且ツ二分シ、附屬硬毛亦最モ多ク、中ニハ分枝シタルモノアリ。

次ノ時代ハめたのーぷりあすト稱スヘキモノニシテぞーえ移ラントスルノ時代ナリ（第八版第三圖）、此時ノ特徴ハ体ノ大ニ延長シタルト（体ノ長サハ其幅ノ凡二倍半）第三對ノ附肢ノ縮小シタルト等ナリ、体ハ第三對ノ附肢アル處ヨリ以後ノ環節ニ分タレタルヲ見ル。

附肢ハ多數ノ關節ニ分タル、第四乃至第七對ノ附肢ニハ短キ硬毛僅ニ生ス、体ノ後端ニアル硬毛ハ六對ニ增加セリ。

單眼附近ニ密集シタル細胞ト同シク口部附近ニモ附肢ノ基部ニ細胞ノ密集アリ、神系ノ基ナリ。

此有樣ノ動物一回脫皮スレハ直チニぞーえ時代ニ移ル脫皮ハ甲ノ後ニ於テ始マリ、舊皮ハ腹面ニ垂ル、

ぞーえ　第一及ヒ第三對ノ附肢ハ尚ホ游泳ノ用ヲナス、第一對附肢ノ下部ハ短節五ツヨリナル、第三對ノ附肢ハ顎ニ變化シ其先端ニアリタル內外ノ枝ハ漸次消失ス、第四、第五對ノ附肢ハ太ク短キ硬毛ヲ有シ、食物咀嚼及支持ノ用ヲ補助ス、第七及ヒ第八對ノ附肢ハ游泳ノ用ヲナス（第八版第四圖）。

体ハ大ニ延長セリ、其長サハ幅ノ凡ソ三倍、是レ体ノ後端即チ最後ノ環節ノ急ニ延長シタルニヨル故ニ此部分ノ細胞ハ疎ニ散在シ、染色シタル標本ニテモ殆ント無色ナリ、此時代ニ至レハ數多ノ環節現ハレ又筋肉發達シ体ヲ屈曲シ能フニ至ル。

上唇ニハ一個ノ突起アリテ前ニ向フ、又種類ニヨリ甲ノ前緣ニ一對ノ短キ突起ノ生スルコトアリ（第八版第四圖）、此突

あすニ至リテハふじつぼ類ノのーぷりあすト混シ居ルト數ニ於テ甚タ少キトニヨリ之ヲ見出スニ大ニ困難ヲ感セリ、ふじつぼ類ノモノト異ナリテ肉眼ニテ見出ス時ノ目標トナルヘキ點ハ附肢ノ長キト移動モ從ッテ多少悠々タルトニアリ。

のーぷりあす　此時代ノ特徴ハ第一乃至第三ノ三對ノ附肢游泳ノ用ヲナス點ナリ、前ニ述ヘタル如ク此時代ノモノハ見出スコト甚タ困難ナルヲ以テ採集シタル數少シ。

就中最モ幼稚ニシテ孵化後餘リ時ヲ經サルモノト認メラルヽモノアリタリ（第八版第一圖）。其体甚タ小ク長サ一みめノ四分一ナリ、楕圓形ニシテ腹面ニ於テ稍々扁平ナリ、其長徑ハ短徑ノ凡ソ二倍ナリ、体ノ後端ニシテ且ッ腹面ニ一對ノ硬毛アリ、附肢ハ三對ノミニシテ皆先端ニ於テ太クシテ圓ク稍々棍棒狀ヲナス、關節ナシ、長サニ於テハ第二對ノモノヽ長サハ体長ノ凡ソ二分一ニ當ル、各肢ノ先端ニハ硬毛生ス、即チ第一對ノ先端ニ三、第二對ノ内枝ニ二、外枝ニ五或ハ六、第三對ノ内枝ニ三、外枝ニ三ナリ。

又第一對ノ附肢ニハ其側面ニ三個ノ短キ硬毛生ス。

此時代ヨリ體ノ先端、眼ノ近傍ハ細胞密集シテ腦ノ基礎ヲ作ル。

其後一回モ脫皮シタルモノカト思ハルヽモノハ附肢幾分カ延長シテ先端ニ至ルニ從ッテ細シ、第一對ノモノハ体長ノ凡ソ三分二ニ當ル。

次ノ時代ニハ第三對附肢ノ後ニ四對ノ附肢アリ（第八版第二圖）、其内前二對ハ單一ナレドモ後ノ二對ハ先端二ッニ分ル、然レドモ此等ノ新シキ附肢ハ皆短小ニシテ腹面ニ隱在シ、体ノ移動其他ノ爲ニハ未ダ何等ノ用ヲモナサズ、腹面或ハ側面ヨリ見ルトキハ体ノ後半部ハ前半部ト鈍角ヲナス、即チ体ノ腹面凹ミタルナリ。

次ニハ体ノ後端ニ近ク横ニ褶襞出現シ、此ヲ上下二部ニ分ッ、下部ハ後端左右ノ二辨ニ分レ、各々三個ノ硬毛ヲ具フ、中央ノ硬毛最長シ、是最初ニ現ハレタルモノナリ。

ヽニ至レリ、只みゅっれる氏以後未タのーぷりあすノ觀察ヲ公ニシタルモノナキヲ遺憾トス。

予ハ昨年品川沖及ヒ備後尾道近海ニテくるまえび屬發生時代ノモノヲ集メ研究スルコトヲ得、のーぷりあすヲモ多少採集シ得タルヲ以テ其研究結果ノ大畧ヲ報告セント欲ス。

此研究ニ供シタル材料ハ水產局在勤坂井安三郎ノ苦心シテ採集シタル浮游生物中ヨリ同人ト共ニ撰ミ出シタルモノナリ。

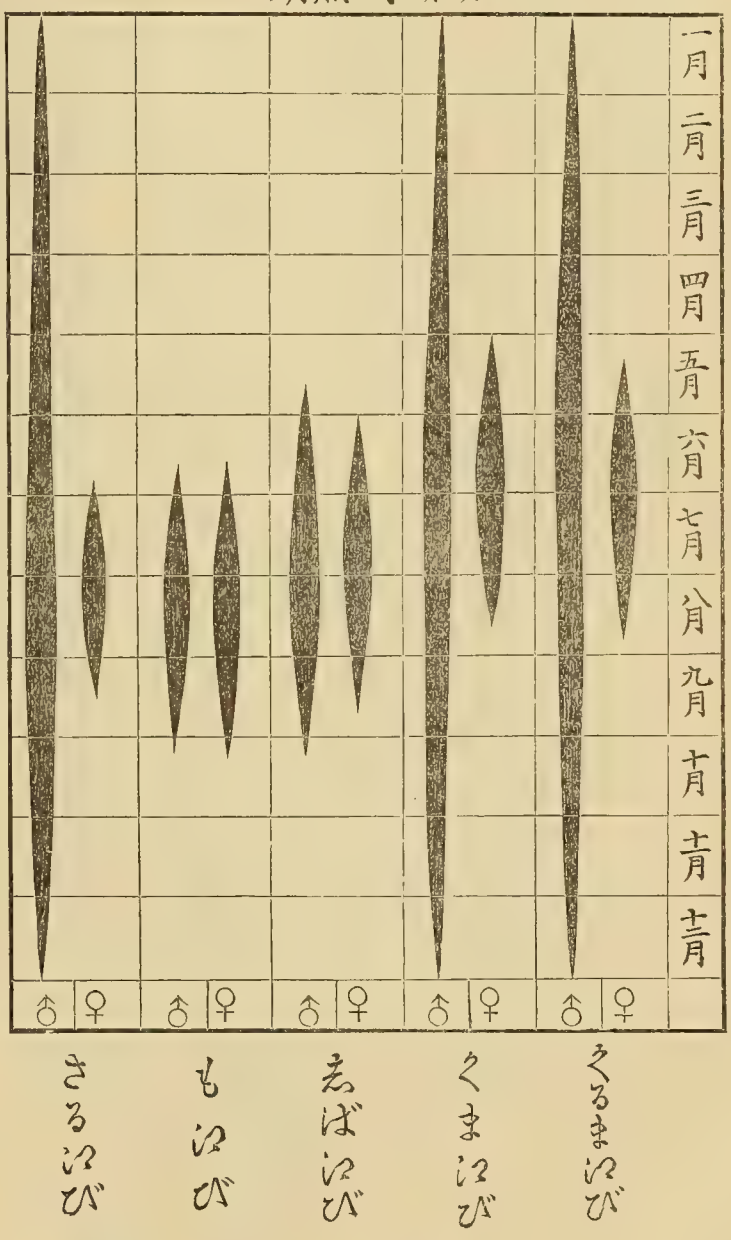
又技師西川藤吉ハ昨年十一月下旬ヨリ十二月上旬マデノ間ニ伊豆川奈ノ浮游生物中ヨリ本屬近似ノえび（Sergestes）ノ幼ヲ採集セリ、くるまえび屬ノモノト異ナルハ甲ニ數多ノ棘ヲ有スル點ナリ。

予ノ研究材料中品川沖ニテ採集シタルモノハ成長シタルしばえびノ數多捿息スル所ヨリ採集セリ、又同處ニテハ同時ニ一二寸ノ幼稚ノモノモ多ク漁獲セラルヽヲ見タリ、然レトモ此等幼稚ノモノトらーばトノ中間ノモノヲ得サリシヲ以テ予ノ材料ハくるまえび屬中何種ニ屬スルヤハ知ルコトヲ得サリシカ多分しばえびノモノナルベシト信ス、又尾道近海ニテ採集セシモノハ少クモ二種ノえびニ屬シ東京ニテ得タルモノトハ全ク別種ノモノナリ。

品川沖ニテ材料ヲ採集シタルハ八月一杯ナリ、常ニ種々異リタル時代ノモノヲ得タリ、大雨後又ハ臺場以北ニテハ材料ヲ得ルコト少カリシ、比重凡ソ一、〇一以上ノ處ニテ多ク採集セリ、又尾道近海ニテハ九月上旬ヨリ十月上旬ノ間ニ採集セリ、海水比重ハ一、〇二五乃至一、〇二八アリタリ。

まいしす時代以前ノモノハ羸弱ニシテ飼養シ易カラサルモまいしす時代ヨリハ時々空氣ヲ送リ又食物（生活セル或ハ死セル小動物）ヲ與フレハ時計皿ノ如キ小キ器物内ニ於テモ養フコトヲ得、他甲殻類ノらーばニ比スレハ運動活潑ナラス、室内ニ於テ光線ノ來ル方ニ集マルコトハ他ノモノニ同シ、頭部ヲ前且ツ上ニ向ケテ游泳ス（第八版第四圖）、色ハ薄シ、まいしす時代マテハ長キ第一及ヒ第二對ノ附肢ヲ動カシ游泳スルヲ以テ他ノ小甲殻類ト區別シ易シ、然レトモのーぷり

第一表




發生（第八版ヲ見ヨ）

今ヨリ三十七年前（千八百六十三年）ふりっつみゃっれる氏始メテくるまびえ屬ノえびハ十脚類中他屬ノモノト異ナリテのーぷりあす時代ヨリ孵化スルモノナルコトヲ報告シ大ニ學者ノ注意ヲ惹キタリ、而シテ餘リ特別ノコトナレハ往々之ヲ疑フモノアルナリ、然レトモくらうす（千八百七十六年）ぶるっくす（千八百八十二年）両氏ノ研究報告アリテみゃっれる氏ノ説いわ以後ノ研究ノ正シキコトヲ證明シタリ、又ぶるっくす氏ハ十脚類中るーしはー（Lucifer）モ亦のーぷりあすヨリ發生スルコトヲ觀察セリ依テみゃっれる氏ノ見タルくるまえび屬ノのーぷりあすノ觀察モ正シキモノト信セラル

又雌雄ニヨリテ稍々形狀ヲ異ニス、即チ雌ト雄トヲ比較スルトキハ雌ノ方形大ク、甲大ク、尚舳狀突起長ク且ツ上方ニ曲レリ、加之雄ノ第一腹環節ノ下緣ハ多ク切レ込ミヲ有ス、又雄ノ附肢ニハ往々雌ニ見サル突起ノアルヲ見ル、然レトモ此等ノ差異ハくるまえびノ如キ大ナル種類ニ於テハ著シカラス。

生殖腺ハ心臟ト腸管トノ間ニアリテ四方ニ分枝シ夥多ノ微小ナル囊ノ葡萄果狀ニ集合シタルモノナリ、概チ春ヨリ漸次成熟シ、夏期ニ至リテ產卵ヲ始メ九月又ハ十月ニ終ル、其卵ノ熟スルハ卵巢ノ一部ツヽニ熟シテ同時ニ全部熟スルコトナシ、卵巢ハ未熟ノ時ハ無色透明ニシテ甚タ細シ、稍々熟スルニ到リ黃色不透明トナリ成熟ニ及ンテ綠色ヲ帶ヒ甚タ太ク、外面ヨリ透キテ見ユ、長クシテ頭尖ヨリ尾節ニ至ル。

通常雄ノ生殖腺即チ睾丸ハ卵巢ヨリ早ク熟ス、其長サハ卵巢ニ比スレハ甚タ短ク、只胸部ニノミ存ス、無色半透明ナリ、精蟲モ卵ト同シク同時ニ睾丸全部ニ熟スルコトナシ、熟シタル精蟲ハ畧ホゞんぐりノ如キ形ヲナス、大ナル種類ニテハ輸精管ノ極端膨大セル部分ニ於テ特別ノ精包ヲ生スレトモ小ナル種類ニテハ只此部分ニテ精蟲集マリテ一塊ヲナスノミニシテ別ニ被包ナケレハ精包ト稱スルコトヲ得サルヘシ、未熟ノ雌ニシテ雄ト交接シテ貯精腔ニ精蟲ヲ藏スルモノ少カラス、或ハくるまえびノ如ク一ケ年以上生存スルモノハ產卵後直チニ交接スルモノアリ。

雄ノ交接器ハ第一腹肢ノ一部ノ變形シタルモノナリ最初ハ左右別々ニアレトモ生殖素ノ熟スルニ至レハ極メテ微細ナル鉤狀突起ニヨリ中央ニテ相合ス、雌ノ受精腔ハ第四及第五胸節ノ左右両脚間ニアル部分ノ變形シタルモノナリ。

くるまえび、くまえび、さるえびニテハ雄ハ周年成熟セル精蟲ヲ有シ且ツ周年交接ス。

雌雄生殖線成熟ノ期間ハ第一表ニ於テ明ナリ。

交接及產卵ノ模樣ハ不明ニ屬ス。

ニテハ地中海及ビ北海沿岸ニ於テ只三種ヲ産スルノミ、此等ノ種類ハ太平洋ノモノト全ク種類ヲ異ニス、太平洋及ヒ印度洋ノ種類ハ両洋ニ通シテ廣ク分布セルモノ多シ(第九版ヲ見ヨ)。

從來知ラレタル種類ハ四十有餘種アリ、内太平洋ニ産スト知ラレタルモノ凡ソ二十種、印度洋ニ凡ソ十五種、太西洋ニ三種、歐州沿岸ニ三種ナリ、而シテ本邦沿岸ニ産スト知ラレタルモノハ十三種ナリ、以テ本邦沿岸ノ此屬ノえびニ富ムコトヲ知ルニ足レリ。

本邦以外ニ於テ此屬ノえびノ夥シキハ濠州北岸ノとっれす海峽ヨリわらふら海、ふぁりびん群島ノみんどろ海及ヒ印度ノべんがる海等ナリ、而シテ現今此等ノ海ニ於テモ多少ノ漁獲ハ之アルカ如シト雖本邦ニ於ケルカ如ク盛ニ其漁獲ヲ營ミ居ラサルガ如シ、然レトモ之ヲ開始スルモノアルトキハ本邦ヨリ輸出スル乾蝦ニ影響ヲ及ボスコト少ナカラサルベシ、本邦ニ於テハ瀬戸内海ニ最モ多ク伊勢海、東京灣、有明海、鹿兒島灣亦多シ、琉球近海臺灣ニモ亦多少産シ、日本海沿岸及ヒ東北地方ニハ之ヲ産スルコト少ナシ。

此屬ノえびノ食物ハ生活セルカ或ハ半ハ腐敗ノ動物ナリ、就中甲殻類、(とびむし、われから等)稚小ナル貝類、蠕蟲類、棘皮類、魚類等ヲ多シトス、しばえびハ硅藻等ノ微細ナル海藻ヲ多ク食ス、食物中甲殻類、貝類、棘皮類多キハ殻皮ヲ堅固ニスル點ニ於テ大ニ利益アリ、しばえびノ殻皮ノ他種類ニ比シ甚ダ軟弱ナルハ石灰分多キ食物ヲ取ラサルニヨルモノナラン、蓄養中饑ユル時ハ往々「友喰」ヲナス、顎ハ甚タ強固ナル咀嚼面ヲ有スルヲ以テ食物ハ概ネ碎破セラル。

未タ精確ナル事實ヲ得サレトモ壽命ハ普通凡ソ滿一年ノモノヽ如シ、即チ今年生シタルえびハ明年産卵シテ死スルモノヽ如シ、然シくるまえび等ノ如キ大ナル種類ノ雌ハ滿一年ニテハ成熟セス、故ニ少クモ二年以上生存ス。

雌雄ノ別アリ、其區別ハ外觀ヨリスルモ甚タ容易ナリ、雌ハ第三脚ノ基ニ生殖孔アレトモ雄ニハ第五脚ノ基ニ在リ、又雌ノ第一腹肢ハ左右別々ニシテ簡單ナレトモ雄ニテハ左右相合シテ特殊ノ器官ヲ作ル。

# 本邦産くるまえび屬

附第一版——第九版

農商務技師理學博士　岸上鎌吉

くるまえび屬（Penaeus）ハ本邦ニ産スル甲殻類ノ中ニテ經濟上最モ貴重ノモノナリ、食物及ヒ釣餌トシテ廣ク用ヒラレ、且ツ乾製シタルモノハ支那輸出水産物ノ中ニテ重要ノ位置ヲ占ム、其價貴クシテ先ツ贅澤食品ノ一トシテ算スルコトヲ得ヘシ、他ノ甲殻類ト同シク消化宜シカラサルヲ以テ滋養品トシテハ優等ノモノニアラサルモ其味ハ甚タ甘美ナリ、加之殻皮ハ往々肥料トシテ用キラル其主要成分ハ炭酸石灰及ヒ燐酸石灰ナリ。

輸出重要品要覽ニヨレハ乾蝦ノ輸出額ハ年々百五十萬斤内外ニシテ其原價ハ二十萬圓内外ナリ、勿論乾蝦ノ原料ハ只ニくるまえび屬ノモノノミニアラサルモ他ノ種類ハ極メテ少數ニ過キス。

當今ノ處ニテハ輸出品トシテハ乾製シタルモノノミニシテ又輸出先ハ支那ノミナレトモ西洋風ニ倣ヒ罐詰トナストキハ大ニ歐米諸國ヘ輸出スルヲ得ヘシ、彼ノ諸國ニ於テモえび類ヲ珍重スルコト本邦ニ異ナラス加之近來供給ヲ減シタル爲彼國商人中本邦産罐詰ノ輸入ヲ望ムモノアリト聞ク、尤モ彼ノ國ニテ多ク珍重セラルヽえびハ長サ一尺以上ニ達スルモノニシテ本邦ニハ産セス、又くるまえび類トハ種屬ヲ異ニス、然レトモ彼國人ノ嗜好ニ適スレハ異種ノえびト雖輸出シ得ヘシ、勿論原料ニハ肉柔ク味美ナルモノヲ撰ハサル可カラス、又品質大小ニ不同ナク數多ク揃ハサル可カラス。

此屬ノえびハ概ネ沙泥質ノ海底ニ住ム、大群ヲナスコトアリ、又往々灣内ニアリテ急ニ居處ヲ轉スルコトアリ、季候寒冷トナルトキハ淺處ヨリ漸々深處ニ移ル、多クハ三十尋以下ノ淺處ニアリ、故ニ手操網、打瀬網ヲ以テ漁スルニ適ス、繁殖力大ニシテ成長速ナリ、大ナル種類ハ長サ九寸ニ達ス、小ナルモ二寸ニ下ラス、暖熱ノ地ニ多ク寒地ニ稀ナリ、多ク太平洋西部及ヒ印度洋ニ産ス、太西洋ニハ北米合衆國南部、西印度及ヒぶらじる沿岸ヲ通シテ僅々二種ヲ産シ、歐州

# 水產調查報告

本邦產くるまえび屬

附圖九枚

第八卷第壹冊

農商務技師理學博士 岸上鎌吉

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# K. KISHINOUYE—THE JAPANESE SPECIES OF THE GENUS PAGRUS

WITH Pl. II—VII AND 3 WOODCUTS

TOKYO

1901

Compliments of the Author.

# THE JAPANESE SPECIES OF THE GENUS PAGRUS.

BY

KAMAKICHI KISHINOUYE.

WITH PL. II—VII AND 3 WOODCUTS.

The present paper, dealing with the systematic work, is intended to be the first part of the contributions to the natural history of tai (Pagrus). The tai is the most valued prime fish in Japan. It is considered necessary in the table of the feast, especially in the case of celebration. The method of catching the fish is consequently well developed and its supply in the market is constant. The fish is very delicate in taste. We are not satiated with it, even in the case when we take it daily. It has a magnificient form, with large, strong fins, and beautiful coloration. The wide distribution and the constant supply of the fish are also useful factors in augmenting the importance of the fish.

The following table shows the total quantity and value of the tai, taken from our waters, except Formosa, in each of the past six years, 1895—1900.

| | Weight in Kwan | Value in Yen |
|---|---|---|
| 1895 | 4 674 552 | 1 617 655 |
| 1896 | 5 117 708 | 2 214 377 |
| 1897 | 4 752 147 | 2 609 187 |
| 1898 | 4 445 846 | 2 695 830 |
| 1899 | 4 178 697 | 3 316 733 |
| 1900 | 5 228 840 | 4 109 802 |

## PAGRUS, Cuvier.

Body oblong, laterally compressed, covered with large scales. Head large; preoperculum entire, operculum not armed. Mouth small, terminal and low. Anterior teeth in the jaws cardiform, the outer teeth are large and acute, while the other teeth are small and slender. Both jaws have generally two rows of molars. Vomer and palatines are generally toothless. Posterior nostril oblong and larger than anterior. Fins strong, caudal fin forked. Air-bladder simple, pyloric cœca few, cheeks scaly.

Four species of this genus are described from our waters—*Pagrus major*, *P. cardinalis*, *P. tumifrons* and *P. ruber*. But the presence of the last mentioned species, *P. ruber* Döderlein, is ambiguous. I can not yet find any specimen, corresponding to Döderlein's description, though he writes that it is often found in the market of Tokyo. *P. cardinalis* and *P. tumifrons* differ in dentition from the type of *Pagrus*. Besides that difference, however, there is no special mark of distinction—in the external characters, viscera, skeleton, etc. Therefore I classify these two species in the genus *Pagrus* as the previous authors did.

## PAGRUS MAJOR.

(Pl. IV)

*Chrysophris major*, Temm. et Schleg. Fauna Japon. Poiss. p. 71. pl. 35. *Pagrus major*, Günther. Catal. Fish. Vol. I. p. 470; Steind. und Döderl. Beitrage z. Kenntn. d. Fisch Japons. II. p. 19; Nyström. Bih. K. Svensk. Akad. Handl. IV. Afd. 13 Bd.

D. 12/10. A. 3/8. L. lat. 57—60. L. transv. 8—9/16—17.

Height of the body about $^1/_3$ of the total length, the length of the head $^1/_4$; the diameter of the eye is $^1/_4$ of the length of the head.

Spinous portion of the dorsal fin is about equal in length to the remaining portion and is continuous with each other without marked demarcation in height. First and second spines short, seldom exceed in length the diameter of the eye, third or fourth spine longest. Pectoral fin large, its tip reaches the origin of the anal fin or a little more backward. Posterior and lower margin of the pectoral is concave. 6—8 rows of scales between the preorbital and the inner ridge of the preoperculum. Limb of the preoperculum is partly covered with a few scattered scales in many cases. Pyloric cœca 4. Teeth well developed. 2 rows of molars on both jaws (Pl. VII, fig. 1). Vomer and palatines toothless. Frontals coalesced and solid; their surface nearly smooth with fine striæ (Pl. VI). Occipital crest thin and triangular, its upper border is a little thicker at the posterior portion. First spurious interneural is sickle shaped and very thick (Pl. VII, fig. 1, c). Coloration beautiful. Back reddish, generally with greenish lustre and there are many blue spots. Belly silvery. Iris of the eyes brownish with golden lustre. Upper portion of the orbit blue. Upper, posterior margin of the operculum and the root of the pectoral fin dark brown. Lower part of the caudal fin whitish, tinged with blue, while the posterior margin of the fin is generally fringed with black. In old specimens the coloration is dusky and blue spots are not found generally. Largest fish is over one metre in length and about fifteen kilogrammes in weight. Biological minimum size is about 30 cm. Spawning season April and May.

Geographical distribution. Japan, from the southern part of Hokkaido to Formosa; Corea; China.

Vertical distribution. Depth of 20—200 metres. In the spawning season the fish come to shallow waters of the depth of about 20 metres.

This species is known as tai, madai or ōdai. It is the common

and largest tai in the market. Average weight of the adult fish in the market is about one and half kilogrammes. The fish about two kilogrammes in weight is very delicate in taste and very beautiful in coloration. Old fish are coarse in taste and dusky in color.

Food of this fish consists of Mollusca (Lamellibranchiata, Opisthobranchiata, Gasteropoda, Cephalopoda), Crustacea (Decapoda, Stomatopoda, Schizopoda, Cirripedia), Vermes (Polychæta, Gephyrea), Echinodermata (Holothuroidea, Asteroidea, Echinoidea), Brachiopoda (Lingula) and Pisces (Clupea, Engraulis, Caranx, Ammodytes, etc.). The fish is very voracious. In one case, I found 56 full-sized sardine and anchovy in the stomach of a fish of about 80 cm. in length.

The fish swimm the shallower strata of waters at night than at daytime. In the spawning season the fish come in schools to shallow and quiet waters. Thus the Inland Sea furnishes a very big spawning ground for this species. Millions of the fish come to the sea through the narrow straits between Hondo and Shikoku. In the sea, thousands of the fish are sometimes caught in one haul of a seine.

The fish spawn in daytime. The egg is buoyant, spherical and transparent. Its diameter is about 1 mm. The yolk is simple with one oil globule which is tinged pinkish. The diameter of the globule is about $^1/_5$ the diameter of the egg. It is very hard to distinguish these eggs from others as there are no special characteristics. It is hatched out in 3—4 days in nature (ca 15° C.). The hatched out lava is about 1. 5 mm. in length. Eggs may be fertilized artificially.

Captured chiefly by hand-and long-lines. Different kinds of nets and seines are also used; but they are worked in the spawning season only, except some gill nets.

This species was caught by the prehistoric people of our country. A piece of the skull of this fish with a broken end of a spear head, stuck into it, was found from a shell-mound of Shiizuka, Province of

Hitachi and is now kept in the Anthropological Institute of the Imperial University, Tokyo. The spear head is made of bone. Such implement of the same pattern is found from many shell mounds. Thus anthropologists were enabled by that discovery to know the use of the implement. The piece of bone is the coalesced frontals. It measures 8 cm. in length, 6 cm. in breadth and 2 cm. in thickness. On comparing this bone with the skeletons of my collection, we find that the bone would have belonged to a fish about one metre in length, *i. e.* a fish of the




A. Coalesced frontals with a broken spear head, stuck in them, found from a shell mound. Natural size.

B. A spear head, made of bone, quite similar to the broken one, stuck in the coalesced frontals. Natural size.

maximum growth. At present it is quite imppossible to see a tai of such size in a depth of water where the fish can be caught with a spear.

## PAGRUS CARDINALIS.

(Pl. II)

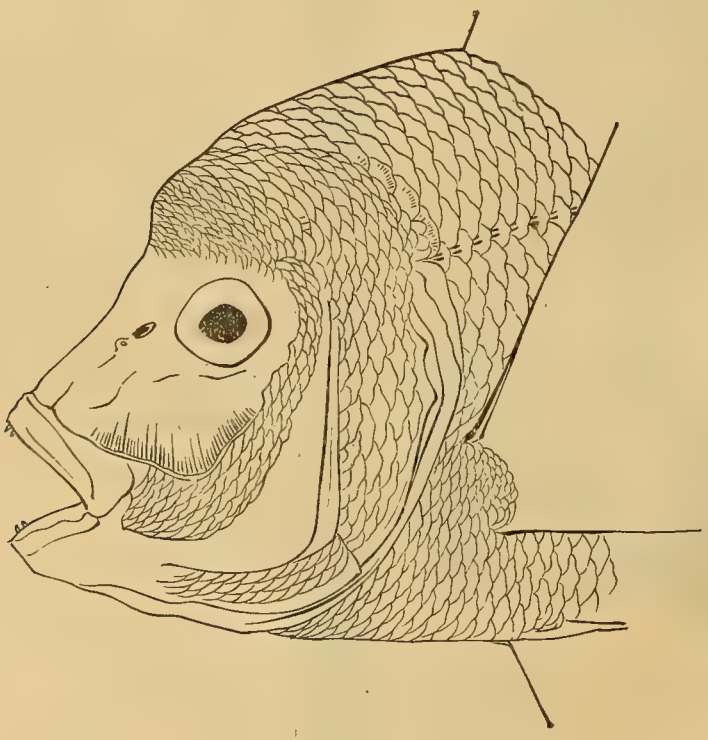
*Sparus cardinalis*, Lacepédè.

*Chrysophrys cardinalis*, Temm. et Schleg. Fauna Japon. Poiss. p. 69. pl. 33.

*Pagrus cardinalis*, Günther. Catal. Fish. Vol. I. p. 470; Steind. und Döderl. Beitrage z. Kenntn. d. Fish Japans. II. p. 19; Nyström. Bih. K. Svensk. Akad. Handl. IV. Afd. 13 Bd.

D. 12/10. A. 3/9. L. lat. 51—68. L. transv. 6—7/13—15.

Height of the body about $^2/_5$ of the total length, the length of the head $^1/_4$; the diameter of the eye is $^1/_4$ of the length of the head. First and second spines of the dorsal fin shorter than the diameter of the eye, third or fourth spine longest. Distal portion of the third and



Head of a male fish.
$^1/_2$ natural size.

fourth spines are slender and flexible. Pectoral fin long and large, the distal end of which reaches the third spine of the anal fin or much more backwards. Posterior and lower margin of the pectoral concave. 5 or 6 rows of scales between the preorbital and the inner ridge of the preoperculum. Limb of the preoperculum entirely naked. Pyloric cœca 4. Teeth weakly developed (Pl. VII. fig. 3). Both jaws have 2 rows of small conical teeth. Outer row has no grinding teeth. Only a few grinding teeth in the inner row. 6—15 teeth on the vomer (Pl. V. fig. 1). They are conical, slender and grow in a round group.* Frontals separate, porous like a honey comb. Occipital crest long and very thick, thickest near the anterior end (Pl. V. figs. 1—3). First spurious interneural slender (Pl. VII. fig. 3, c). Coloration in general resembles that of *P. major*; but it is much brighter. Posterior margin of the operculum dark red. Iris partly brown, partly silver white. Grows to a length of about half a metre. Fish, commonly found in the market is about 30 cm. long and about 1 kilogramme in weight.

Geographical distribution. Japan, Kiushu, southern coast of Shikoku, northwestern and northeastern coasts of Hondo; China; Corea.

Vertical distribution. Depth of 10—150 metres. This species does not come to shallow water in the spawning season.

Profile of the head of this species is different in different sexes. In the male the occipital crest is rectangular, so that the forehead is very prominent. In the female, on the other hand, the occipital crest is triangular and the forehead is beautifully arched.

Food and habitat are about the same as *P. major*. Caught chiefly by lines.

Known under various names, such as chidai, chikodai, hirekodai, hirenaga, kundai, hanadai, etc.

* Mr. Takashi Nakamura of our bureau collected an extraordinary skull of this species which wants these vomerine teeth at all. This will be the skull of a hybrid between *P. major* and *P. cardinalis*.

Dentex

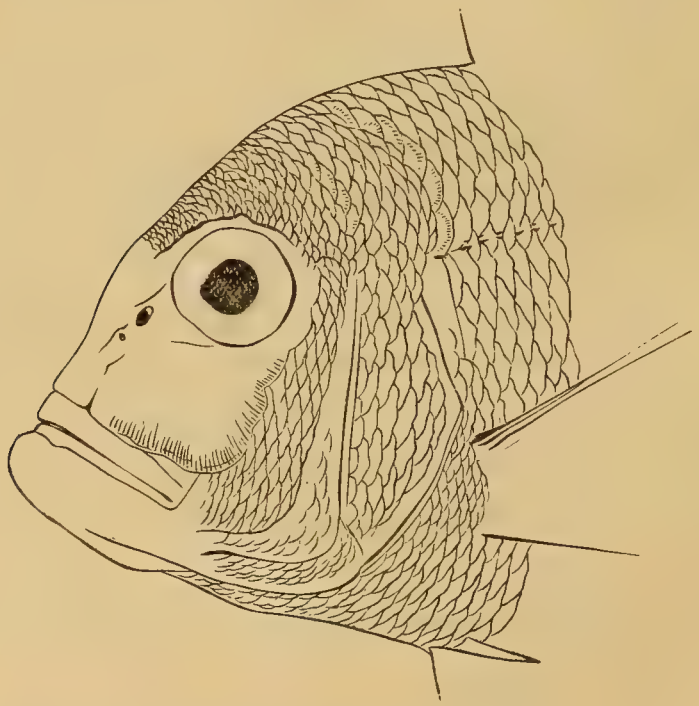
# ~~PAGRUS~~ TUMIFRONS.

Dentex hyselosoma, Bleeker (Pl. III)

*Chrysophrys tumifrons*, Temm. et Schleg. Fauna Japon. Poiss. p. 70. pl. 34.
*Pagrus tumifrons*, Günther. Catal. Fish. Vol. I. p. 470; Nyström. Bih. K. Svensk. Akad. Handl. IV. Afd. 13 Bd.

D. 12/10. A. 3/8—9. L. lat. 46—49. L. transv. 6/12—17.

Height of the body about $^2/_5$ of the total length, the length of the head $^2/_7$, the diameter of the eye is $^1/_3$ of the length of the head. First and second spines of the dorsal fin rather long, compared with those of the two preceeding species, and the second spine is longer than the diameter of the eye. Third or fourth spine longest. Lower jaw is very thick in old individuals, especially in the male. Pectoral fin long, its tip reaches the third spine of the anal or a little more backward.



Head of an old male fish.
$^1/_2$ natural size.

Caudal fin small. 5 or 6 rows of scales between the preorbital and the inner ridge of the preoperculum. Limb of the preoperculum covered with scales. Pyloric cœca 4. Dentition is very different (Pl. VII. fig. 2). No grinding teeth. Only single row of conical teeth of about the same size is found besides granular teeth. Vomer and palatines are destitute of teeth. Premaxillary long, its length is about twice its height. Frontals coalesced and thick, but not solid (Pl. V. figs. 5,6). Their surface presents many small blunt ridges. Occipital crest high, its upper margin thick and pointed behind (Pl. V. figs. 5—7). Anterior end of the crest is united with the crest of the frontals. Frontals and postfrontals do not meet in one continuous line, but leave a large foramen between them (Pl. V. fig. 8). First spurious interneural slender (Pl. VII. fig. 2, c). Coloration is reddish with golden lustre. Two or three markings of yellowish color are found at the dorsal margin of the body.* Lower portion of the body is silvery white. No blue spot. Membrane forming the posterior margin of the operculum pale blue. Iris reddish. Fish about 30 cm. in length and about 800 grammes in weight is common. This is the smallest species of *Pagrus* in Japan.

Geographical distribution. Japan, Hondo, Shikoku, Kiūshū and Formosa. Not known from the Inland Sea, northeastern coast of Hondo and Hokkaidō.

Vertical distribution. 100—150 metres. This species does not come to shallow waters and is always found in off-shore waters.

Lives on sandy or muddy bottom and feeds on Crustacea (Chiefly Grapsus), Echinodermata (Chiefly Ophuroidea), Mollusca (Philine), Vermes (Chœtopoda) and Pisces.

Caught by lines.

Fish, 20 cm. long, is mature.

* Unfortunately these yellow markings were omitted by the artist in the colored plate, as they are not distinct in the adult fish.

Known under various names, such as kidai, kodai, makodai, benikodai, kinkodai, renkodai, banjiro, mekke, etc.

Tokyo, December 10, 1901.

# EXPLANATION OF PLATES.

## Pl. II.

Pagrus cardinalis (Lacépède). Young female. Natural size.

## Pl. III.

Pagrus tumifrons (Schlegel). Young female. Natural size.

## Pl. IV.

Pagrus major (Schlegel). Immature fish. Natural size.

## Pl. V.

Skull of Pagrus cardinalis. Male. Natural size.

Fig. 1. Superior view.
Fig. 2. Lateral view.
Fig. 3. Posterior view.
Fig. 4. Anterior wall of the brain capsule, seen after removing the parasphenoid.

Skull of Pagrus tumifrons. Female. Natural size.

Fig. 5. Superior view.
Fig. 6. Lateral view.
Fig. 7. Posterior view.
Fig. 8. Anterior wall of the brain capsule, seen after removing the parasphenoid, to show the paired foramina between the frontals and the postfrontals.

## Pl. VI.

Skull of Pagrus major. Natural size.

Fig. 1. Superior view.
Fig. 2. Lateral view.
Fig. 3. Posterior view.

## Pl. VII.

Fig. 1. Bones of Pagrus major. Young fish. Natural size.
Fig. 2. Bones of Pagrus tumifrons. Natural size.
Fig. 3. Bones of Pagrus cardinalis. Natural size.
a. Intermaxillary.
b. Dentary.
c. 1st spurious interneural.



J.Urata del.

PAGRUS CARDINALIS (Lacep.) ♀
チダヒ

Lith. E. Koshiba.



J. Urata del.

PAGRUS TUMIFRONS (Schileg.)♀
キ ダ ヒ

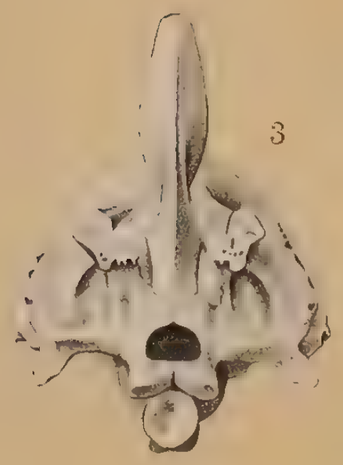
Lith. E. Kosbiba.



J.Urata del. PAGRUS MAJOR (Schleg.) ♀
Immature
マダヒ
幼 Lith. E. Koshiba



1



3



5



7



4



2



8

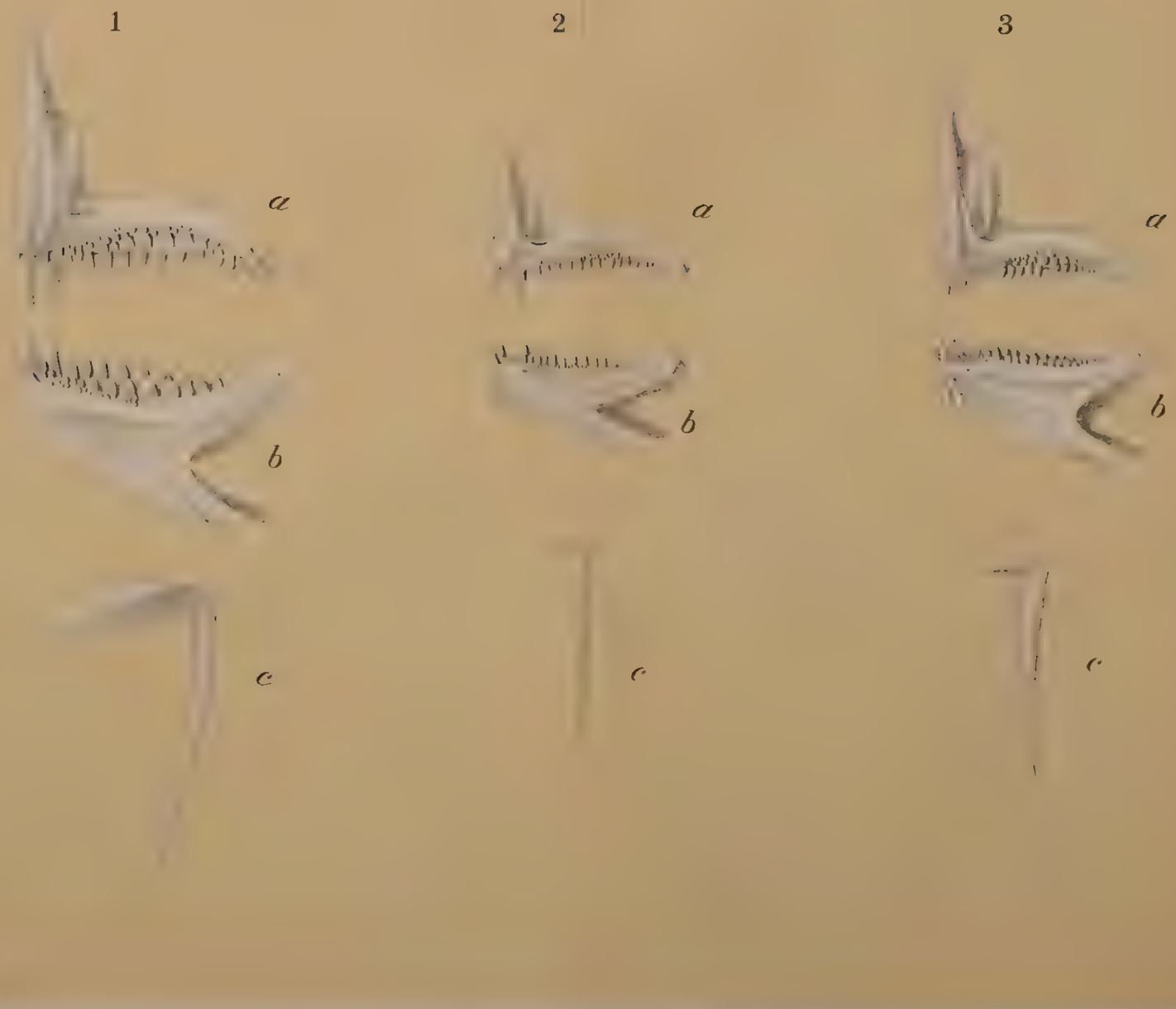


6

J. Urata del.

SKULL OF PAGRUS CARDINALIS ♂

SKULL OF PAGRUS TUMIFRONS



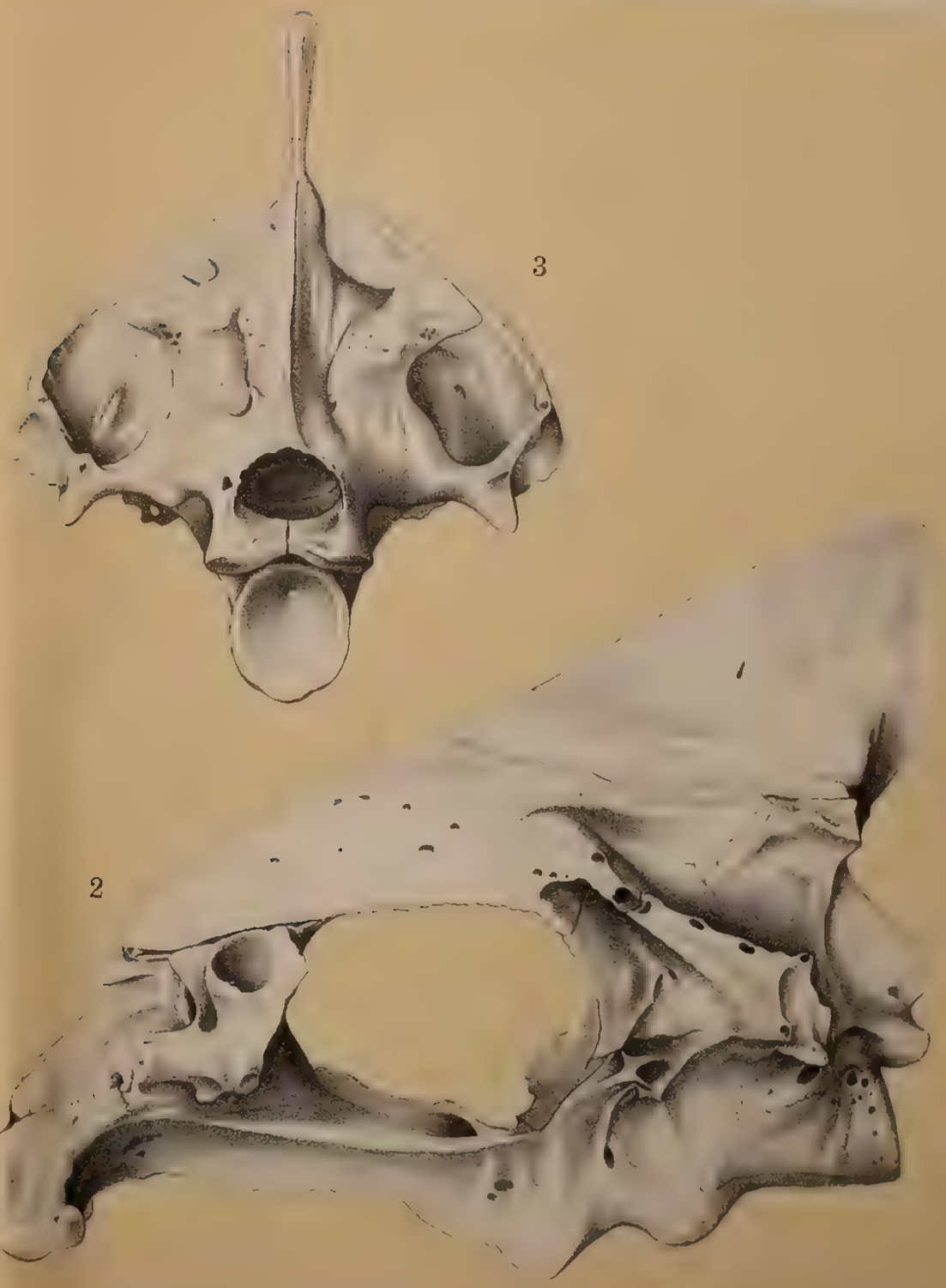

J.Urata del.

1 PAGRUS MAJOR 2 P. TUMIFRONS 3 P. CARDINALIS

*a Intermaxillary b Dentary c 1st Spurious Interneural*



1



3

2

J. Urata del.

SKULL OF PAGRUS MAJOR

明治三十五年一月二十八日印刷
明治三十五年一月三十一日發行

農商務省水產局

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